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SUPER Rainy-Day Activities

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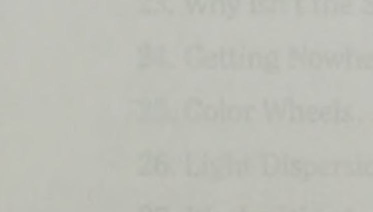
Science Experiments



NOTE: The magnifying glass in the upper right-hand corner indicates the level of difficulty of each science experiment, from easy to hard.

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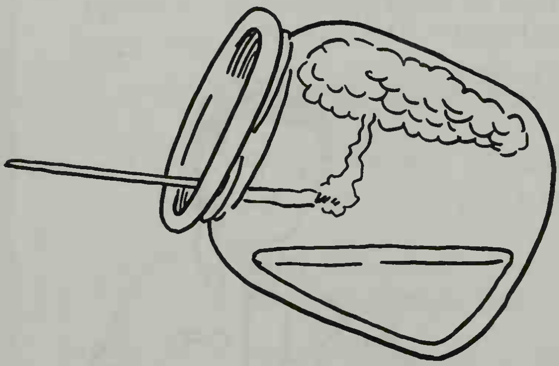
Introduction: The Wonders of Science

What makes the sky blue? Why does the sun rise and set? How do birds and planes fly? Why do liquids boil and freeze? When you start thinking about the world around you, questions like these just keep coming. The word "science" comes from *scientia*, the Latin word for knowledge. And that is exactly what science is—a huge collection of information that helps us understand the natural and physical world. You'll be amazed at the science you learn as you perform the fun and fascinating experiments in this section!

Discover the shocking truth about electricity in Static Charge on page 52, Creating a Force Field on page 54, The Human Antenna on page 55, and The Light Barrier on page 60. Learn why liquids boil in Boiling at Low Pressure on page 26.

Interested in the atmosphere? Take flight without ever leaving the ground when you learn about gravity with Gravity as a Pump on page 14 and Air Apparent II on page 28. How about the weather? Check out Cloud in a Jar on page 71.



Do you ever feel like you're seeing things that aren't really there, or missing things that are obvious? Before you have your eyes examined, try Optical Illusions on page 44, Getting Nowhere on page 38, I C 3 D on page 49, and Password on page 50. If you find colors intriguing, experiment with Why Isn't the Sky Green? on page 36, Color Wheels on page 40, and Light Dispersion on page 42. And while you're at it, find out some fun and fascinating facts on the natural world around you with Show Me the Light on page 66.

Go with the Flow!

If you start an experiment and find that you're missing something on the list, don't panic! By using your imagination, you may find something else that will work just as well. For example, if your experiment calls for a twist tie and you don't have one, try bending a paper clip into the right shape. Or perhaps a piece of tape will work. Remember, scientists throughout history have often made great discoveries by making simple substitutions.

Branches of Science

From the planets and stars to the way things move and react, there are countless things to explore in the world of science. Most people who study science usually try to examine just a small part of the world. Here are just a few of the larger branches, or areas, of science and what the scientists in those fields do.

Astronomy: Astronomers study all objects in the universe, including planets, suns, stars, comets, galaxies, and even other universes.

Biology: Biologists study living things (plants, animals, and people), their surroundings, and how they eat, move, grow, reproduce, and evolve, or change, over time.

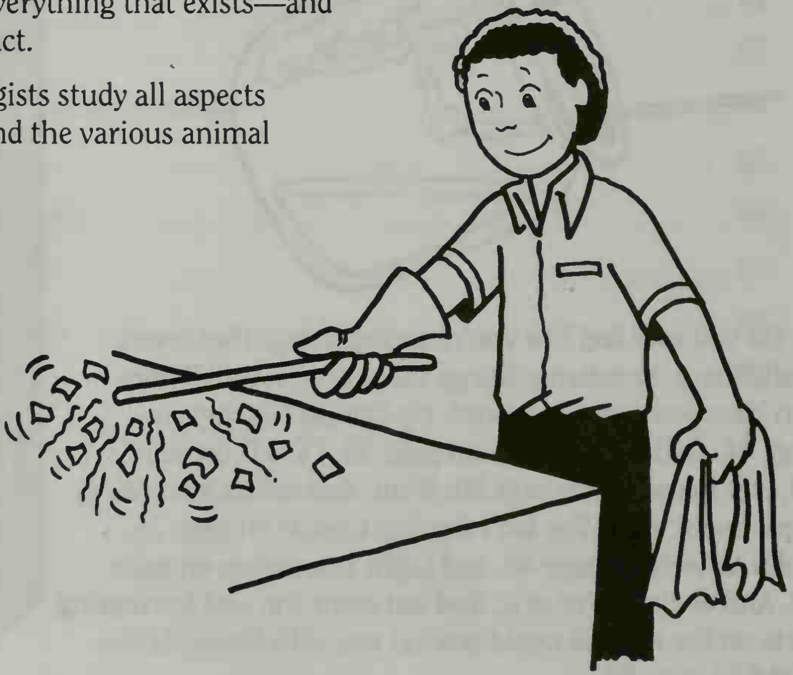
Botany: Botanists examine the different types of plants, the places where they grow, and how they grow.

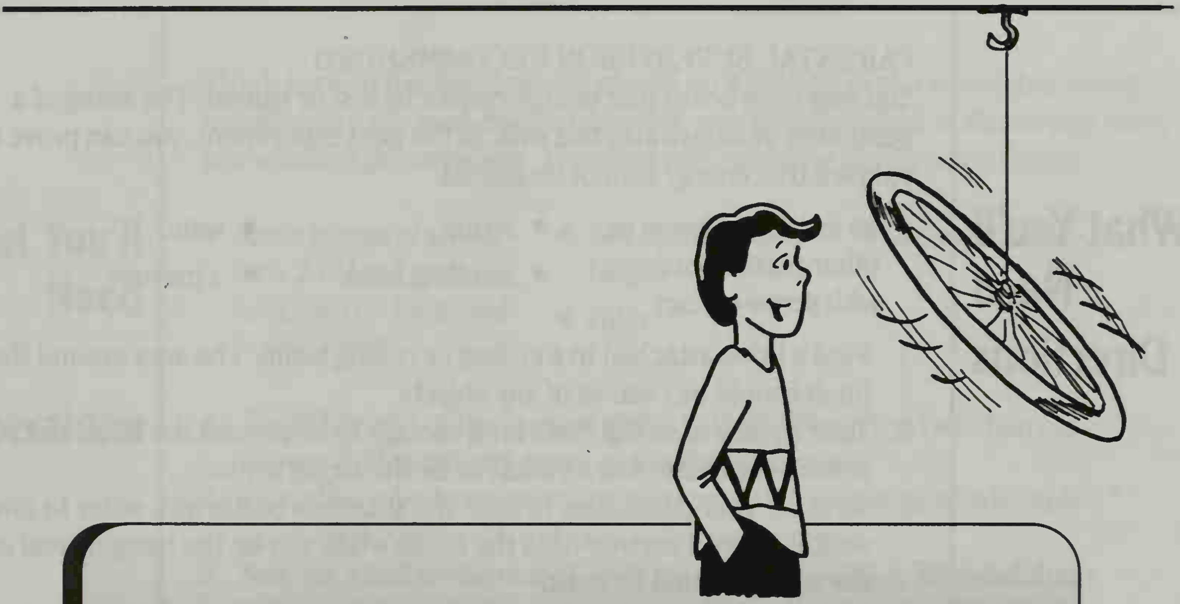
Chemistry: Chemists study the composition, structure, and properties of substances and how they change or combine to form other materials.

Geology: Geologists examine the earth's land, particularly its rocks, minerals, and fossils, to learn about the earth's history and life on the planet.

Physics: Physicists study energy and matter—the materials that make up everything that exists—and how they interact.

Zoology: Zoologists study all aspects of animal life and the various animal classifications.





Harder-to-Find Materials

Most of the things you'll need to conduct the science projects in this section are found either in your home or in the local supermarket. You may need to visit a specialty store for the items below:

✔ ceiling hook (hardware store)

✔ ½″ thick wood board (lumber or hardware store)

✔ bicycle tire (bicycle shop)

✔ Erlenmeyer flask, 500 ml with rubber stopper (chemist's shop or toy store)

✔ paintbrush, medium-sized (art supply store)

✔ transparent plastic or acrylic plate, 1 sq. ft. x ¼″ thick (hardware store)

✔ tempera paints, red, yellow, and blue (art supply store)

✔ transparent rubber tubing (hardware store or aquarium supply store)

1

Let's Get into the Swing of Things

EASY
MEDIUM
HARD

PARENTAL SUPERVISION RECOMMENDED

You may have heard that energy cannot be lost or gained. The swing of a pendulum demonstrates this well. In the next experiment, you can prove to yourself that energy cannot be gained.

What You'll Need

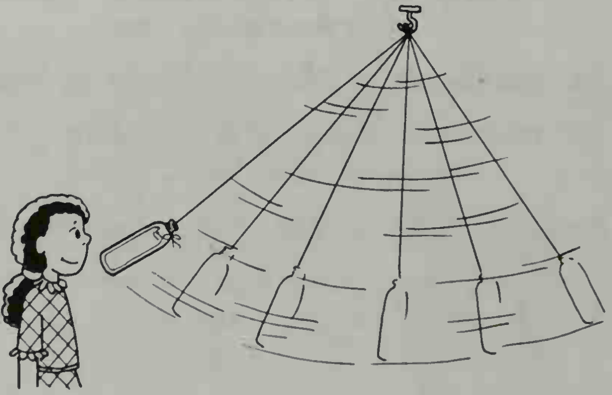
- an empty shampoo or other plastic bottle, with screw-on cap
- string
- a ceiling hook
- water
- a partner

Directions

1. Find a hook attached to a ceiling or ceiling beam. The area around the hook should be cleared of any objects.
2. Take a piece of string that's long enough to tie around the hook and still reach your chest. Ask an adult to tie the string in place.
3. To make your pendulum, first fill the shampoo bottle with water to give it weight. Have a partner hold the bottle while you tie the hanging end of the string around its neck.
4. Now we'll test conservation of energy . . . and your nerve! Hold the bottle and back up with it until you can hold it as high as your nose (but don't touch it to your nose).
5. Now let go and stand very still. What happens? Did you flinch?

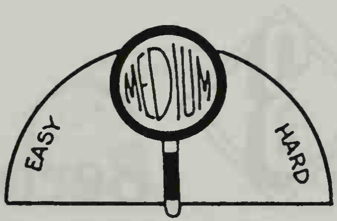
Why?

When you lifted the pendulum to your nose, you had to do a little work. When you then let go, all the effort you used to lift it went right into the pendulum. In other words, the pendulum swung with the same amount of energy as it took to lift it up. On its return swing, the pendulum could only come as high as you had lifted it before, because that's when it ran out of energy. The amount of energy you give up is the amount of energy you get back. If, for example, someone had no money and you gave them a dollar, he or she could only give you a dollar back—that's conservation of energy.



2

A Swing in Time



Think back to the last time you played on a swing. Do you remember rising higher with each push from a friend? If your friend pushed at the *wrong* time, you wouldn't get anywhere. Knowing why holds the key to many things.

What You'll Need

- seven pieces of string (one 24″ long, two 12″ long, two 8″ long, and two 5″ long)
- two chairs of same height
- ruler
- six large nails

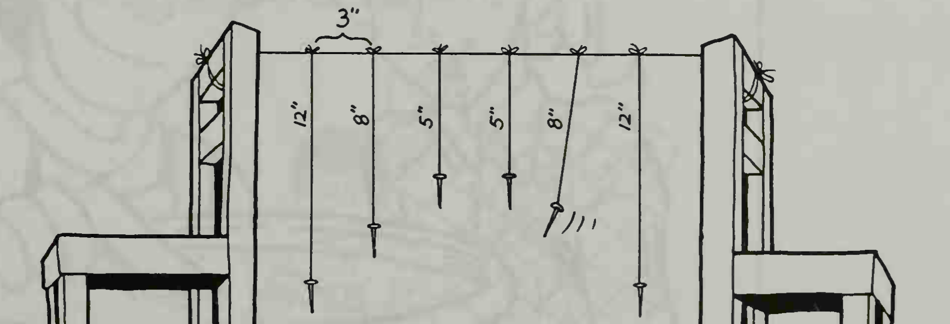
Directions

1. Tie either end of the longest string to the backs of the two chairs as shown. Pull the chairs apart so the string is tight.
2. Using the ruler to measure, tie the remaining strings approximately 3″ apart on the suspended string, in the order shown.
3. Next tie a nail to the end of each string. You now have six pendulums.
4. Lift one nail (any one you like) toward you, then let go and let it swing. Push the nail at just the right moment so it swings even higher. What happens? Another nail will start to swing. Which one?
5. Try swinging a different nail. Which other nail starts to swing this time?

Why?

Every pendulum has a natural, or resonant, frequency at which it swings when pushed. (Frequency refers to how many times the pendulum goes back and forth per second. The longer pendulums have a slower frequency than the shorter ones). When a pendulum is pushed at its natural frequency, it will rise higher and higher—just as a swing will when pushed at the right moment.

In your experiment, when you swung one pendulum (say, the 8″ one), small vibrations of the same frequency traveled across the suspended string. When they reached the other 8″ pendulum, they pushed it at the pendulum's natural frequency, so it started swinging, too.



3

Become a Film Star

[✓ EASY] MEDIUM HARD

In this experiment, you'll amaze your friends with your film talents.

What You'll Need

- medium-sized bowl
- finely ground pepper
- a gullible friend
- water
- a bar of soap

Directions

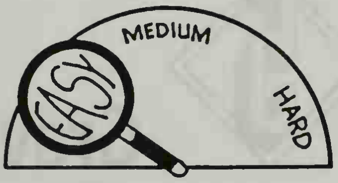
1. Before the experiment, secretly wet your index finger and rub it along a bar of soap.
2. Fill a bowl about three-quarters full of water.
3. Shake the pepper over the water for a few seconds. The pepper will form a film over the water.
4. Say that you heard some humans have an energy field around them that repels pepper—but only certain *special* humans. Have your friend stick a finger into the water. Nothing will happen.
5. Now stick your soaped-up index finger into the water. Wow! *Your* energy field works great!

Why?

Of course, it was the soap film on your finger that repelled the pepper. When you put your finger in the water, the soap quickly spread out in a thin (invisible) layer. As it expanded outward, it pushed away the pepper.

4

Yolking Around



Would you like to give a friend a raw egg to eat but make him or her think it's really hard-boiled? Do the following experiment and you'll learn how.

What You'll Need

- fresh egg
- hard-boiled egg, cooled
- a gullible friend

Directions

1. Have someone mix up the fresh and hard-boiled eggs so you don't know which is which.
2. Now take one egg and spin it. Take note of how fast it spins. Spin it again, then stop the spin by putting your index finger on the egg for a second. What happens to the egg when you take your finger off?
3. Spin the second egg. Does it spin faster or slower than the first egg? Spin the egg again, then tap it with your finger to stop it. What happens to this egg when you take your finger off? Why does one egg keep spinning? Can you now tell which is the egg you can hand over to your friend and be certain there'll be a mess for him or her to clean?

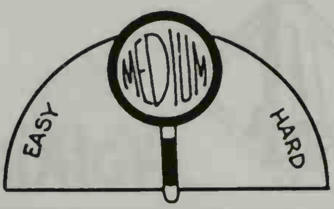
Why?

When you're driving down the road in a car and suddenly come to a stop, have you ever noticed how your body keeps going forward after the car stops? (This is the main reason for seatbelts, of course.) When something is moving, it will continue to move until something stops it. If two things are rigidly connected to each other, stopping one will stop the other.

In a fresh egg, you can think of the shell as the car and the yolk as your body. When the spinning egg comes to a halt, the yolk is free to keep spinning because it is not rigidly connected to the shell. With the hard-boiled egg, however, you can think of the entire egg as the car, because it's solid through and through. When you tap your finger on the egg to stop it, the yolk stops when the shell stops—it has a seatbelt on!

5

Gravity as a Pump



Have you ever thought about what you would do in a flood? How could you pump the water out of your house without a pump? We'll show you how to use the earth's gravitational pull to do exactly that.

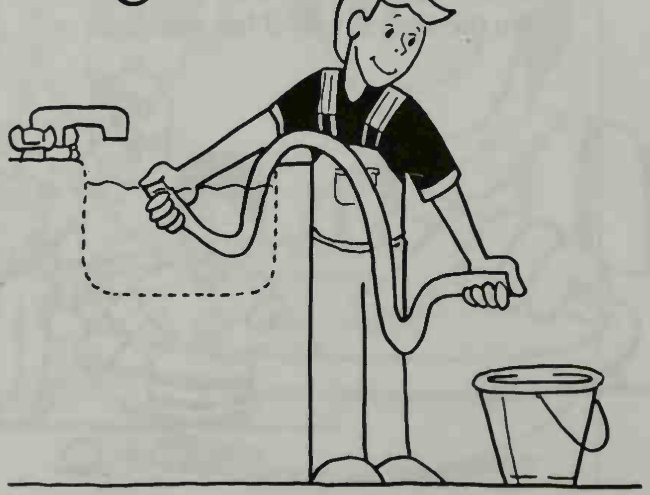
What You'll Need

- approximately ten feet of transparent rubber tubing, ½ ″ to ¾ ″ in diameter
- kitchen sink
- large-sized pail
- food coloring (any color)
- ladder (or stack of books)
- chair

Directions

1. Coil the rubber hose and put it in your kitchen sink.
2. Plug up the drain, then start filling the sink with water. Add some food coloring so you can better watch the flow of water later.
3. As you fill the sink, hold up one end of the hose to the faucet to get all the air bubbles out of the hose as you fully immerse it.
4. Plug up both ends of the rubber hose with your thumbs and bring one of the ends into a pail on the floor (A). Make sure the end in the sink remains submerged.
5. When you've got your pump in place in the pail, take your thumbs off and watch what happens. Why does the water drain out of the sink?
6. Let the water drain completely into the pail (but not out of the hose). Now perform the experiment again, this time draining the water from the pail back into the sink. To demonstrate that gravity is at work, this time place the pail on a chair next to your sink. Will the water drain?
7. Now lift the pail higher by means of a ladder (or a stack of books placed on the counter under the pail). How high does the pail need to be before the water in it will drain into the sink?

Ⓐ



Why?

Just as your body wants to come back down after you jump up, the water in the sink wants to come down (since it is above ground level). But it can't, since the sink contains it. With the hose to drain it, the water now has a way of getting down. The bubbles in the hose push back against the water, preventing it from flowing freely. That's why you have to get all the bubbles out.

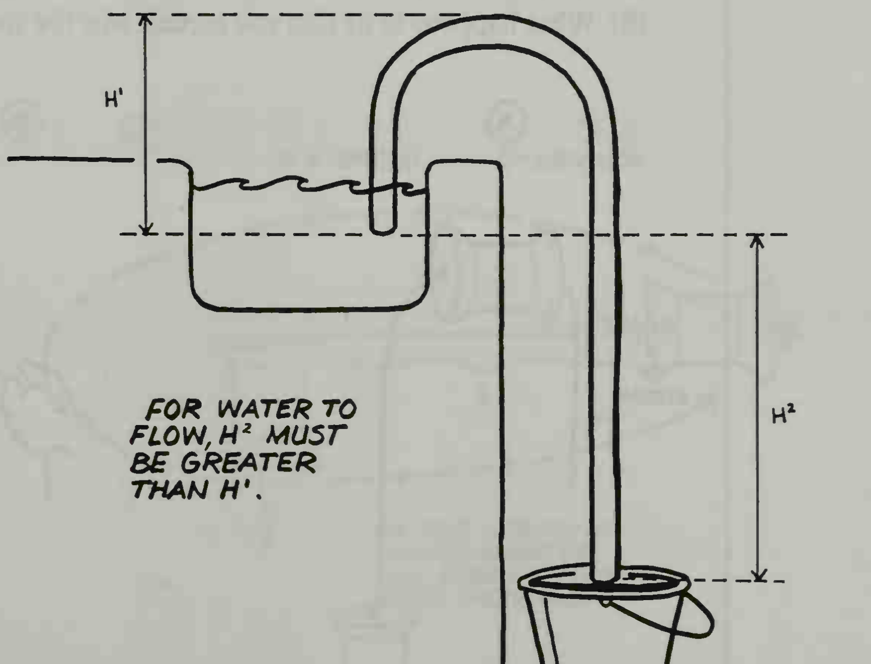
The distance from the sink to the pail needs to be greater than the distance from the sink to the top of the hose (B). If not, the water will not flow. Can you guess why? (The energy needed to pull the water up to the top of the hose would be greater than the amount of gravitational energy available.)

Also, the higher the pail of water, the faster the flow. As you lift the pail higher and higher, you give it more and more energy. The water also has a greater distance to fall and thus more time to gain speed. If you put the pail on top of a ladder outside and let the water drain to the ground, you'll see how quickly the pail is emptied of its water.

Wonder List

- You may think that gravity is a strong force, but compared to other forces (such as magnetic), it is very weak indeed. Consider this: when you jump into the air, for a split second you actually overcome the gravitational pull of the huge planet you're standing on!

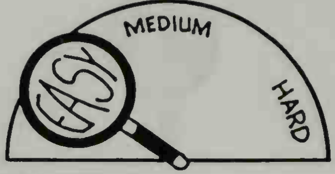
Ⓑ



FOR WATER TO FLOW, H^2 MUST BE GREATER THAN H'.

6

The Skater's Finale



PARENTAL SUPERVISION RECOMMENDED
As a last dazzling move, a figure skater will sometimes whirl in a tornadolike finish, spinning around faster than it seems possible—even on ice. How do skaters do it? Athletic skill has much to do with it, of course, but without a certain principle of science, the move couldn't be done. We'll let you observe this "hyper-spin" at work, then have you perform "the skater's finale."

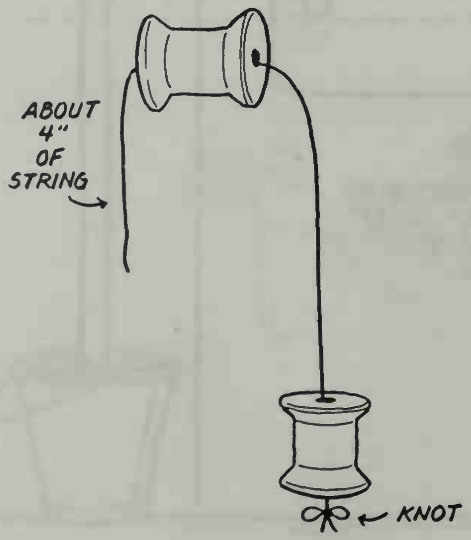
What You'll Need

- two thread spools (without thread, or cover the thread with masking tape)
- approximately 30 inches of string (rawhide or a shoelace will do)
- pair of socks

Directions

1. Tie a knot in one end of the string, then pull it through the first spool so it rests on top of the knotted end.
2. Now pull the string through the second spool, leaving about four inches of string free at the unknotted end (A).
3. Find an open area to perform the experiment. Holding spool 2 with your left hand and the free end of the string with your right hand, swing spool 1 around as shown. When you've got it spinning fairly rapidly, note how fast it is spinning around.
4. Now stop spinning spool 1 and gently pull the string with your right hand (B). What happens to it? Can you explain why the spool spins faster?

Ⓐ



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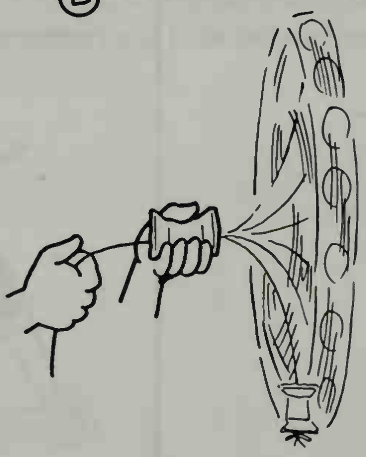


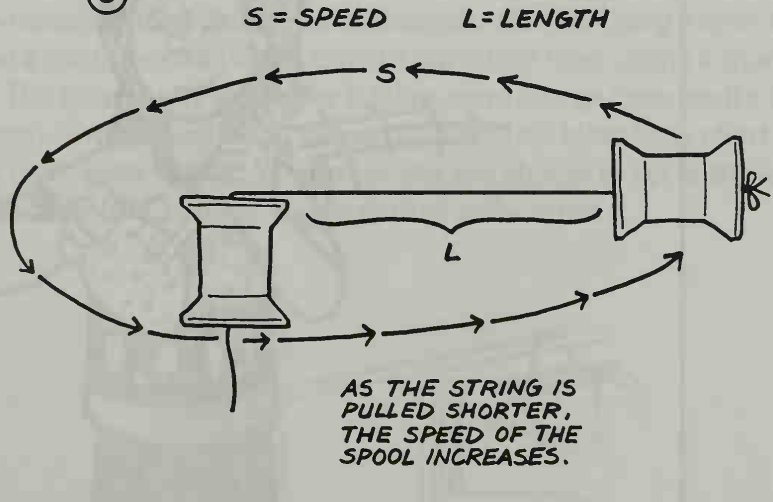
5. Now you're ready for your performance on "ice." Stand on a linoleum or wooden floor with your socks on and your arms spread out. Spin around on one foot like a skater doing a pirouette.
6. Keep your arms outstretched for a moment, then bring your arms in close to your body as you spin. Did you notice that you spun faster when you brought your arms in?
7. Now repeat the performance, this time holding a heavy book in each outstretched hand before you start spinning. When you bring your arms in close this time, you'll notice that the whipping sensation is more intense.

Why?

In the first part of your experiment, why did spool 1 speed up? Well, since the spool was moving, it had a certain amount of energy. Then, when you pulled the string through spool 2, you did some work. This took energy, which you gave to spool 1. (Just as lifting the pendulum "handed over" energy to the pendulum, here, too, pulling the string handed over energy to the spool.) With more energy, the spool could speed up (C).

This same explanation can be used for your skating finale. Since you were spinning on the linoleum floor, you already had energy. Pulling your arms in took a little work. The energy from that work was transferred directly to your spin. So, you spun even faster. When you held the books in your hands, the effect became even more dramatic.

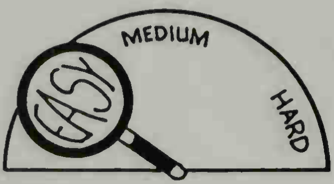
Ⓒ



AS THE STRING IS PULLED SHORTER, THE SPEED OF THE SPOOL INCREASES.

7

Instant Hercules I



You've heard of the ancient Roman hero and strongman, Hercules? After you've performed this experiment, you can join his ranks.

What You'll Need

- a fairly large, fresh potato
- paper straw

Directions

1. Holding the potato in one hand and the straw in the other, try to ram the straw through the potato. Tough to do, right?
2. Repeat the procedure, this time holding your thumb over one end of the straw and ramming with the other end. Wow! How did you get to be so strong?

Why?

When the end of the straw was uncovered and you rammed it into the potato, it was very easy for the straw's flimsy sides to collapse. But when you covered the straw with your thumb, you trapped air inside the straw, and that changed everything. As the straw entered the potato, the trapped air became compressed and pushed outward (like the way a compressed spring pushes outward) against the sides of the straw. The air prevented the straw from collapsing, and you could push it through the potato.

8

Instant Hercules II

PARENTAL SUPERVISION RECOMMENDED
When you understand a few simple ideas, you can perform physical feats that would otherwise be impossible. For example, using a lever, you can move a boulder much too heavy to lift by yourself. This experiment involves the lever—a machine that demonstrates the principle of "mechanical advantage."

What You'll Need

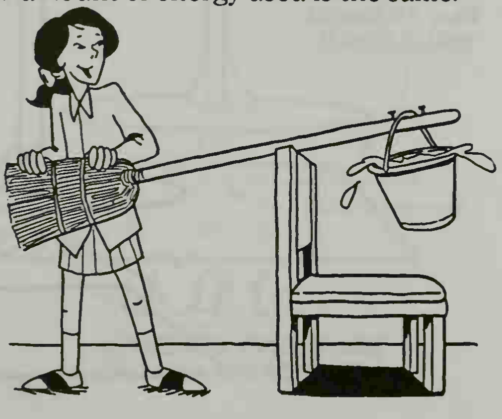
- medium-sized pail
- two 2″ nails
- water
- broom with long handle
- tall chair or bench
- hammer
- ruler

Directions

1. Fill the pail with water and find a spot outside. With one hand, try lifting the pail as high as your shoulder. Can you do it?
2. Now we'll use some mechanical advantage. Hammer the nails into the broom handle (not all the way), one about three inches from the end, the other about four inches. Then place the broom over the back of a chair and place the pail handle between the nails as shown.
3. Push on the opposite end of the broom and lift the pail. Was it easier to lift using the lever? How high can you lift the water?

Why?

Lifting the pail of water off the ground takes the same amount of energy no matter how the job is done, whether by hand or by lever. In your experiment, it was easier for you to lift the pail with the lever because it gave you mechanical advantage. However, using the lever did not mean that you *did less work*. It just meant that you used the same amount of energy in a different, easier way—namely, it took you *longer* to complete the job. Using a lever is a lot like taking a long, easy trail to the top of a hill rather than taking a short, steep trail. The shorter way seems like it takes more energy (because it's steep), but it doesn't. Even though each step on the easy trail takes little effort, there are many more steps to take. Whichever way you choose to get to the top (or lift the pail), the total amount of energy used is the same.



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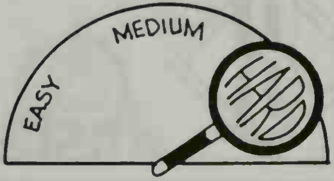
Give Me a Lift



PARENTAL SUPERVISION RECOMMENDED

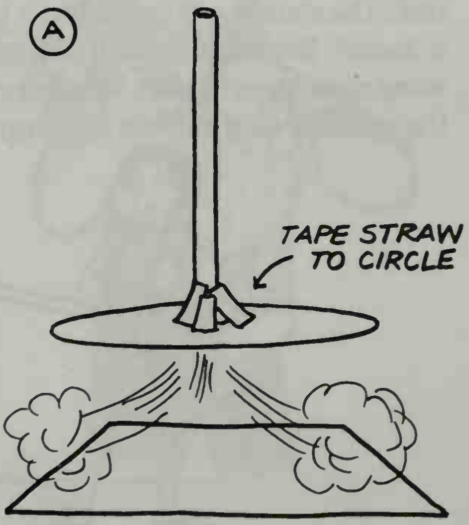
If an airplane can weigh as much as 500,000 pounds, how does it manage to stay in flight? The reason has much to do with the principle of lift. In the next experiment, we'll demonstrate how airflow can create lift.

What You'll Need

- an 8″ x 11″ piece of heavy construction paper
- scissors
- protractor (or jar 4″ to 5″ in diameter)
- tape
- plastic straw
- ruler
- hole puncher (optional)

Directions

1. Using the protractor (or jar), construction paper, and scissors, cut out a circle with a 4″ or 5″ diameter.
2. Cut out another piece of paper, this time a square with 5″ sides. Set the square aside.
3. In the center of the circle, punch out a hole that's big enough for the straw to fit through. (If you don't have a hole puncher, use a pair of scissors to poke a hole through the paper, then twist the scissors around to increase the size of the hole.)
4. Put one end of the straw in the hole and carefully tape it in place as shown (A). This is your blower.
5. Place the square piece of construction paper on a table and hold your blower about two inches above it. Now blow through the straw. As you might have expected, the paper was blown out of place.
6. Repeat the procedure, this time holding your blower about a half inch away. Blow hard on the straw and watch what happens. The square not only didn't get blown out of place, it got sucked up!



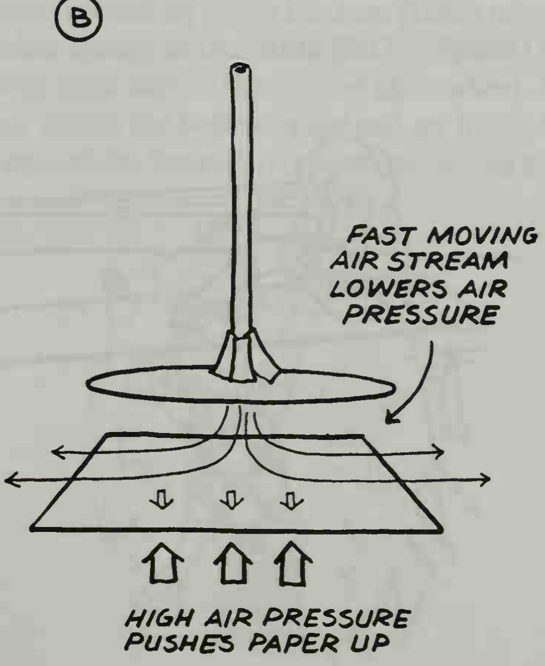
Why?

There is a principle in physics that describes how pressure relates to the flow of fluids (air is considered a fluid). The principle says that as a fluid in a stream moves faster, the pressure on its sides decreases. You can test this for yourself by turning on your garden hose and pinching in the sides. If the water is streaming out very fast, it will be easy to pinch in the sides of the hose. But if the water is streaming out slowly, it will be much harder to pinch the hose closed.

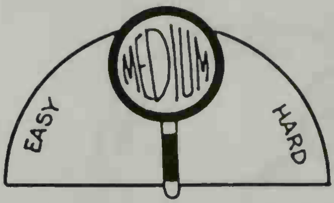
The same is true of air. You created a stream of moving air when you blew through the straw. When you held the square piece of paper two inches away from your blower, the air couldn't be directed into streams (A). However, when you held your blower much closer to the square, the air was pushed outward between the blower disk and the square, forming two streams of rapidly moving air (B). The fast-moving (low-pressure) airstreams between your blower and the square paper pushed down less than the slow (high-pressure) air beneath the square pushed up (believe it or not, there is a layer of air beneath the square). So, the high-pressure air from below pushed the square up—lift!

Wonder List

- Why do lightweight objects get sucked out of a car window at high speed?


B
FAST MOVING AIR STREAM LOWERS AIR PRESSURE
HIGH AIR PRESSURE PUSHES PAPER UP

10 Winging It



In this experiment, we'll build a wing and see how its curvature creates the kind of airflow necessary for flight.

What You'll Need

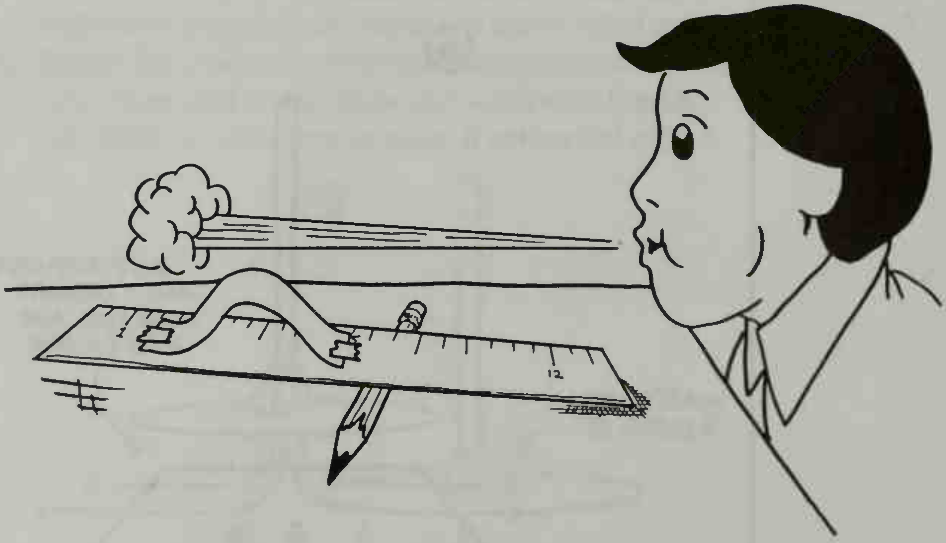
- pencil
- ruler
- strip of paper, as wide as the ruler and 4″ long
- tape

Directions

1. Tape one edge of the strip to the ruler so that it lines up with the 1½″ mark. Tape the other edge down at the ruler's 5″ mark. The paper "wing" should have a bulge in it.
2. Balance the ruler across the pencil. Then push the ruler a little past the balance point, so the paper-wing end seesaws down and touches the table.
3. Now, lay your chin down at the opposite end of the ruler and blow toward the wing. The paper-wing end of the ruler lifts up. How did that happen?

Why?

The curve makes the top of the wing longer than the bottom of the wing. Therefore, the air on top has to flow faster than the air on the bottom (under the ruler) to arrive at the back of the wing at the same time. The fast air flowing over the top pushes down less than the air below pushes up—so up it goes!



11

The Un-Waterfall

If held upside down, water in a pail will naturally pour out. Not always, though. Sometimes it's possible to defy gravity.

What You'll Need

- pail (or small bucket)
- water

Directions

1. Fill the pail about half full with water.
2. Now find an open area outside where you can perform the experiment. Start by swinging the pail at your side to build up momentum.
3. Then swing the pail around in circles, fast, like a baseball pitcher "winding up." Though swung upside down, the water won't spill out.

Why?

When you swung the pail up, the water started moving upward. Before it could reach its highest point, however, the pail got in the way, so you felt the water crashing upward into the bottom of the pail. This crashing accounts for the upward pull you felt on your arm. On the way down, the pail was moving faster downward than the water could naturally fall. So, the pail actually pushed the water from behind, and the water appeared to be stuck to the pail. Because the pail was always in front of (catching) the water moving upward, then pushing the water from behind, it seemed as if some mysterious force was holding the water in the pail.

Wonder List

- How can people successfully live in the zero gravity of outer space? One way is to simulate gravity. In the movie *2001: A Space Odyssey,* there was a giant spinning space station that looked like a wheel. Just as the water stayed pressed against the bottom of the pail, so, too, did the astronauts stay pressed against the floor of the space station—as if there was gravity.

12

Tire in a Gyre

PARENTAL SUPERVISION RECOMMENDED

Have you ever wondered how your bike stays up when you ride it? Why don't you just fall over? Believe it or not, your bike has something in common with our planet.

What You'll Need

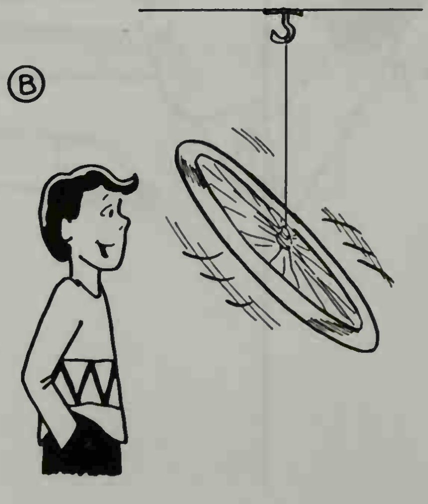
- bicycle tire
- string
- ceiling hook
- a partner

Directions

1. Have a parent help you remove a wheel from your bicycle.
2. Hold the bolts on either side of the center of the tire (the axis) and have someone spin it as hard as they can (A). You've just made a gyroscope.
3. Now try to move your hands up, down, right, and left while holding the gyroscope. What happens? Feels pretty weird, doesn't it!
4. Next, attach the wheel at one bolt to the same string and ceiling hook you used in the Swing of Things pendulum experiment.
5. Hold the wheel parallel to the ground and spin it hard. Holding the two bolts, lift it (with arm movement this time, not hand movement) to a different angle and let go (B). What happens? The gyroscope will maintain its position no matter how you angle it, even vertically.

Why?

The strange forces you felt in trying to move the spinning wheel have to do with an interesting property of gyroscopes. When you push on something, it usually moves in the direction you pushed it. For instance, if you grab the ends of the bike-wheel axis and push forward (while it is not turning), the wheel will move forward. However, when you push on the axis of a *spinning* wheel (a gyroscope), it does not move in the direction you push it. Instead, it moves to the side. That's because the spinning redirects the force pushed against the wheel.



13

You Can't Blow It

It's easy enough to blow up a balloon. But what if the balloon is submerged under water? If deep enough, you'll find you just can't blow it.

What You'll Need

- two plastic straws
- bathtub filled with water
- a twist tie (like the ones used on plastic bags)
- balloon
- masking tape

Directions

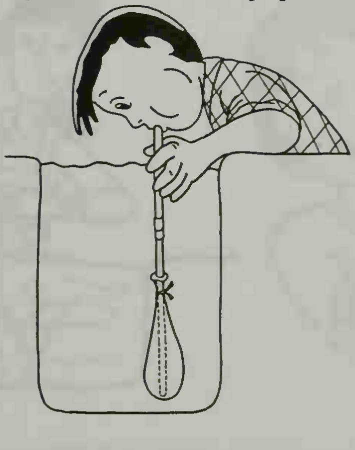
1. Fit one end of a plastic straw into another to double the length of the straw. Seal the joint with masking tape.
2. Now insert one end of your double-straw into a deflated balloon. Push it all the way in until it is *almost* touching the opposite end of the balloon.
3. Wrap the twist tie around the lip of the balloon and tighten it (so that no air can escape the balloon when you blow it up).
4. Hold the double-straw and blow up your balloon. Notice how hard you had to blow to inflate it. It should be fairly easy.
5. Put the balloon under water as shown and try to blow it up again. Was it easier or harder to blow up the balloon while it was submerged?

Why?

You may not notice it, but there is air pressure pushing against you at all times. That pressure is the weight of the entire earth's atmosphere pressing down on you. Although our atmosphere is a whopping 300 miles high, it doesn't crush you because air is so light. Water, however, is much heavier than air—so much heavier, in fact, that only 33 feet of it is as heavy as 300 miles of air. This explains the problem in blowing up the submerged balloon. To blow up a balloon in air, the sides of the balloon must push out against the air pressure pushing in. This is easy for your lungs to do. But under water, the pressure increases dramatically. It's very difficult to push the sides of the balloon out against the water pressure pushing in.

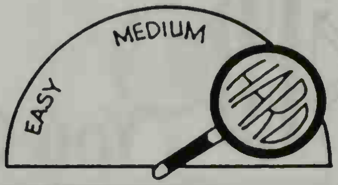
Wonder List

- When diving, why do you need scuba equipment? Why not just use a long snorkel?



14

Boiling at Low Pressure



PARENTAL SUPERVISION REQUIRED

We usually think that a liquid boils because it's very hot. Usually, that's true. But not always . . .

What You'll Need

- 500-ml Erlenmeyer flask from a chemist's shop or toy store (with rubber stopper)
- 4 gallons of water chilled overnight in the refrigerator
- stove burner
- potholder glove
- kitchen sink with stopper
- tap water

Directions

1. Fill the Erlenmeyer flask to the 200-ml mark with tap water.
2. Pour the chilled water into your stopped-up kitchen sink.
3. Now set the flask on a stove burner. When the water is boiling, hold the flask with the potholder glove and carry it over to the sink. Place the stopper in the flask and tap it once. (Don't push the stopper in!)
4. Now, holding the flask by the stopper, put it all the way into the chilled water so it sits on the bottom of the sink. Keep your fingers on the stopper to hold the flask down. What happens to the water? It keeps on boiling!
5. *After five minutes,* take the stopper out and pour the boiling water out into your hand. It's only warm water!

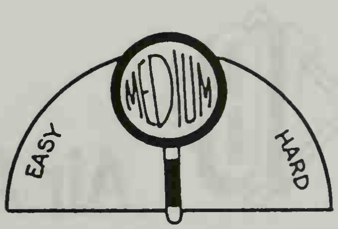
Why?

The water will boil as long as the stopper remains in place. Why? Boiling occurs when the temperature of a liquid is high enough for bubbles to be able to push out against the weight of the air pushing down. The higher the temperature of the liquid, the more forcefully the bubbles can push out.

When your flask was covered and cooled by the chilled water, the air pressure in the flask dropped lower and lower. As a result, the air pushed less and less on the water below, making it easy for the bubbles in the water to push out (or boil). In other words, the lower the air pressure, the lower the boiling temperature, even if the water is ice cold.

15

Air Apparent I



PARENTAL SUPERVISION RECOMMENDED

If you can't see the air, how do you know it's there? We take the air's existence for granted, but the ancient Greeks didn't. They wanted to *prove* its existence. Through an experiment very similar to the one you're about to perform (without the plastic soft-drink bottle!), the Greeks did just that. They proved not only that air existed, but that it also exerted pressure.

What You'll Need

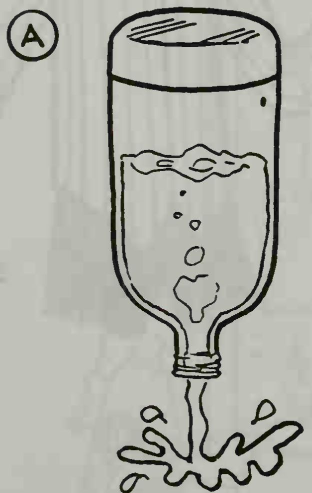
- a 2-liter, plastic soft-drink bottle with metal cap
- hammer
- nail
- water

Directions

1. With the hammer and nail, punch one hole in the metal cap and one in the side of the bottle, about five inches from the bottom.
2. Now fill the bottle halfway and screw on the cap. Holding the bottle with both hands, turn it upside down. What happens? The water pours out in a steady stream (A).
3. Next, with the bottle still held upside down, cover the hole in the side of the container with your thumb (B). (Be sure not to squeeze the bottle.) What happens now?

Why?

When you turned the bottle upside down and allowed water to pour out, air came in through the punched hole in the side to replace the lost liquid. The air rushing in pushed out more liquid. When you closed up the hole, no air was allowed into the bottle to replace the water. The stream of water quickly came to a stop because the air inside the bottle didn't push as strongly against the water as the air outside the bottle pushed against the cap to keep the water in.



16

Air Apparent II

By defying gravity, we'll show another way to prove air exerts pressure.

What You'll Need

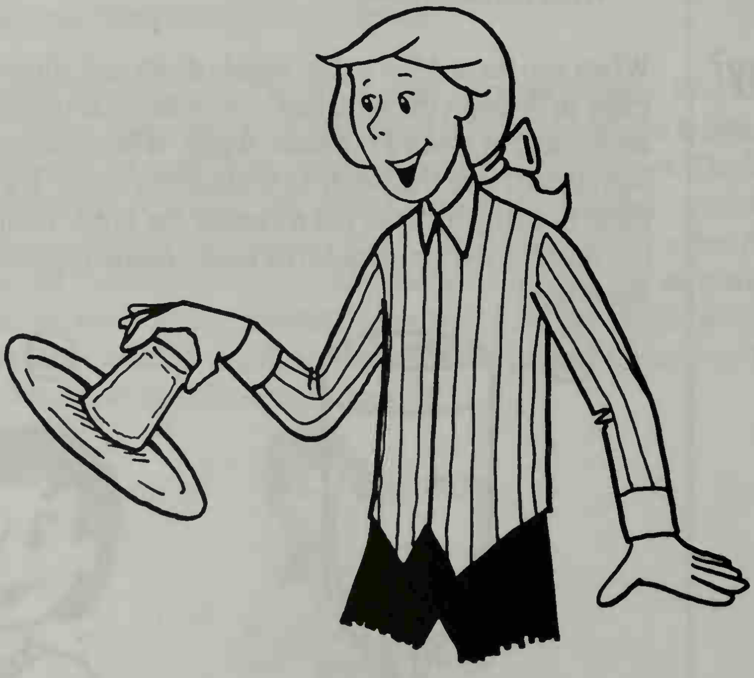
- plastic cup (no larger than 16 ounces)
- plastic or Styrofoam dinner plate
- water

Directions

1. Set the cup in your sink and fill it with water until it's overflowing.
2. Place the plate face down on the cup.
3. Now, holding the cup in one hand (without squeezing it) and, lightly pressing the plate to the cup with your other hand, turn the cup and plate over.
4. Take your hand off the plate and watch what happens. Wow—nothing! Now gently squeeze the cup.

Why?

Though it may be hard to believe, the weight of the water in the cup does not push as hard *down* on the plate as the air pressure below the plate pushes it *up*. It's as simple as that.



17

The Air Also Rises

PARENTAL SUPERVISION REQUIRED
Have you ever seen a beautiful hot-air balloon sailing gracefully in the sky? What keeps it up? It's all in the name.

What You'll Need

- two brown paper lunch bags
- candle
- matches
- ruler
- tape
- one 18″ string, two 12″ strings

Directions

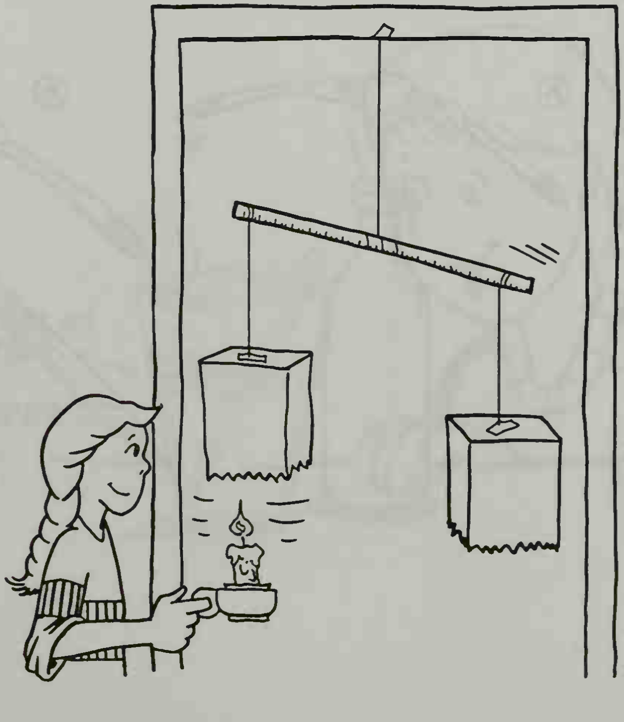
1. Tie the longer string around the middle of the ruler (at 6″ mark) and tape it in place.
2. Tape the other two pieces of string to the bottom of both bags (at center). Then tie the free end of the strings (with bags attached) to the ruler, one at the 1″ mark, one at the 11″ mark. Tape the strings in place on the ruler.
3. Tape the free end of the long piece of string to the underside of a doorframe.
4. Now light the candle and hold it under one bag. What happens?

Why?

A bagful of hot air is lighter than the same amount of cool air. Thus, the bag filled with hot air rises.

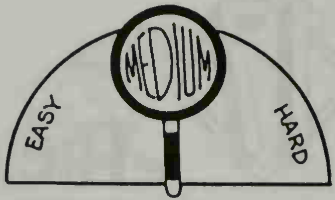
Wonder List

- On a hot day, would the air be cooler near the floor or near the ceiling?



18

High-Wire Act



PARENTAL SUPERVISION RECOMMENDED
Why do you suppose the brave people who walk the high wire at the circus use a balancing bar? We'll let you perform your own act and see.

What You'll Need

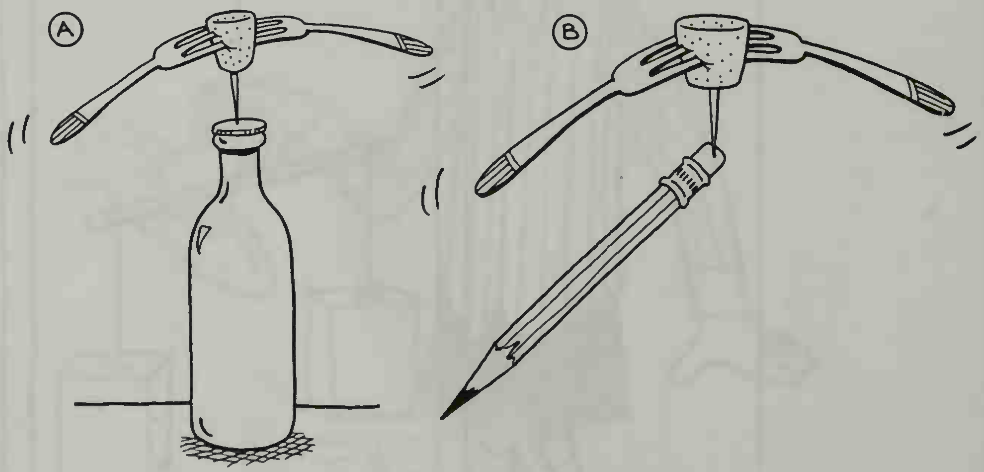
- two identical forks
- cola or vinegar bottle
- needle
- cork (about ¾″ thick at bottom)
- pencil with eraser
- quarter

Directions

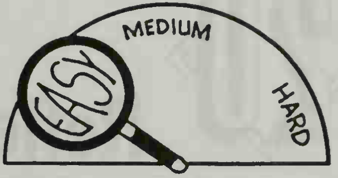
1. Place the quarter on top of the bottle opening.
2. Stick the eye of the needle in the center of the bottom of the cork.
3. Now stick the two forks into either side of the cork as shown.
4. Place your high-wire act on the quarter, needle down (A). How long will it stay balanced? Spin it around and bob it up and down like a seesaw. Set the needle on a pencil eraser (no need to push it in) and tilt the pencil in different directions (B). You've got a great balancing act on your hands.

Why?

On a seesaw, the farther you are seated from the center, the harder you push up the other side as you push down. The same principle is at work in your high-wire act. When one fork was tilted down one way, the other fork was lifted up away from the bottle. The lifted fork then pulled down hard to lift the other fork back up. In this way, the needle is kept balanced.



19 Oil & Water (& Air) Don't Mix



If oil and water (and let's not forget air) don't mix, do you suppose that light travels through them in the same way, or at the same speed?

What You'll Need

- tall, clear glass
- water
- pencil (as tall as the glass)
- cooking oil

Directions

1. Fill the glass three-quarters with water.
2. Pour about one-quarter cup oil into the water. The oil won't want to mix and will bead and float to the surface.
3. Now drop the pencil into the glass. What do you see? The pencil seems to have broken into three pieces.

Why?

Light travels faster in some materials than it does in others. As light travels from one material to another, if it changes speed, it can also change direction (or bend). In your experiment, one edge of the light wave hit the oil boundary first and slowed down. This caused the light wave to change direction. That same light wave then hit the water boundary. It again slowed and changed direction. Since the light is bent, your eye sees the pencil's image as bent.

20

Reflections on Color

EASY MEDIUM HARD

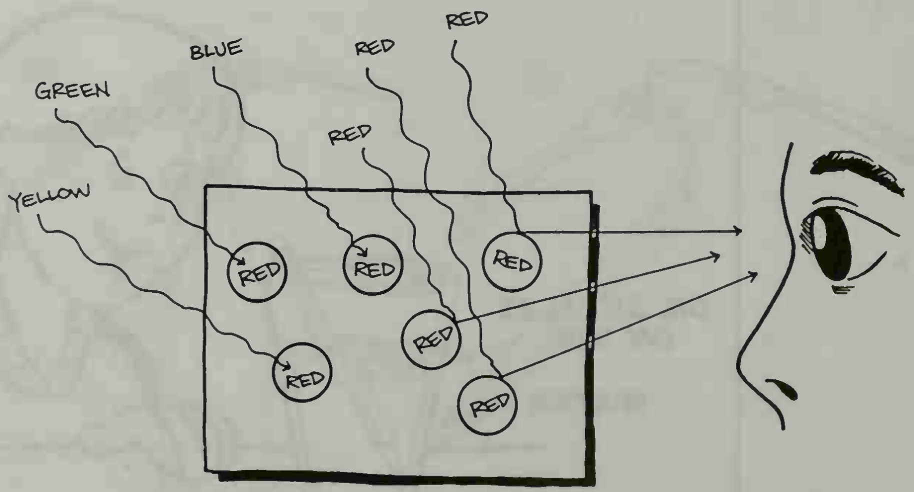
Look around. The world about you (your room, the backyard, the playground) is filled with different colors. Did you know that all these different colors are made of various combinations of just three colors? Can you guess what these "primary" colors are? If you guessed red, yellow, and blue, you'd be right. Let's experiment with color.

What You'll Need

- heavy white drawing or construction paper
- measuring spoons
- medium-sized paintbrush (or use your fingers!)
- red, yellow, and blue tempera paints

Directions

1. Begin by pouring out globs of red, yellow, and blue paint (about a teaspoon each) on the construction paper.
2. Now mix your palette of colors. Start by mixing red with yellow. What color do you get? Wash your paintbrush out, then mix the red with the blue, and then the blue with the yellow. What colors do you get? (Save the colors you created for the Color Wheels experiment.)
3. Next, mix the red, yellow, and blue together. Looks pretty yucky, doesn't it? Experiment by adding various amounts of the three primary colors and you should get . . . black! Would you have guessed that red plus yellow plus blue equals black?



Ⓐ ALL COLORS EXCEPT RED ARE ABSORBED. YOU SEE RED.

Why?

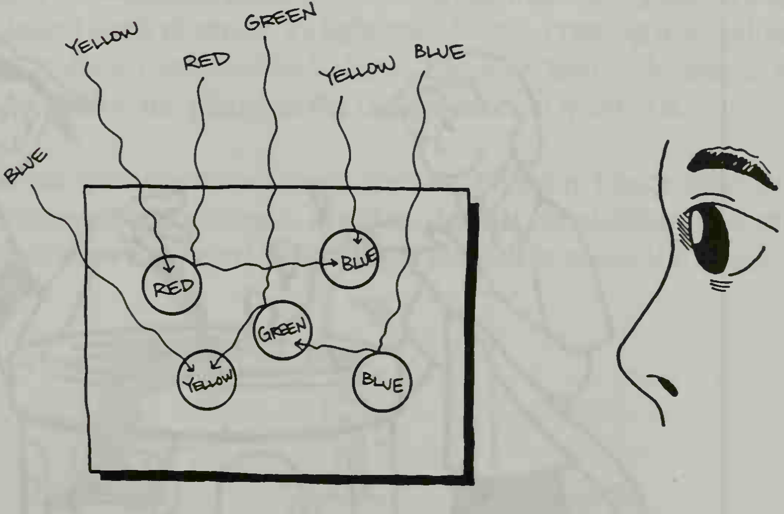
When you mix only two primary colors together, you get a "secondary" color. (The orange, green, and purple you mixed are secondary colors.) When you mix *three* primary colors together, why do you get black? The answer has to do with the way materials—all materials—reflect or absorb the colors of the light spectrum. For example, when you see a green leaf, it is absorbing all the spectral colors *except* green (A). In other words, the leaf is reflecting the color green.

Paint is no different than leaves when it comes to color. A glob of red paint absorbs all colors of the spectrum except red. Yellow paint absorbs all colors except yellow, and blue absorbs all but blue. When you mix these colors together, the net result is that *no color* is reflected—in other words, black (B).

Now that you know how to mix colors, your artist's canvas awaits you, Michelangelo!

Wonder List

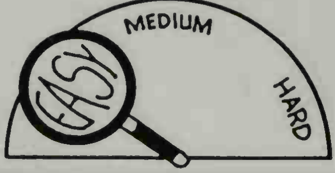
- In what way is a black hole like a glob of black paint? Because of its incredibly strong gravitational pull, black holes "absorb" light and don't let any reflect back out.



(B) ALL COLORS ARE ABSORBED.
YOU SEE BLACK.

21

Glass-Bottom Boat



Why do tropical cruise boats have glass bottoms? Why do scuba divers wear masks? Let's take a look.

What You'll Need

- large, clean plastic garbage can
- clear glass pie dish or bowl
- various household items
- water

Directions

1. Fill the garbage can with water.
2. Now you get to make your garbage can "party mix." Toss an apple, an orange, a comb, a tin box, a colorful coffee mug—anything that will sink but won't get waterlogged—into the can.
3. Look at your mix at the bottom of the garbage can. How well can you see all that stuff? If you're really daring, poke your head *into* the water and look again. It should be even harder to see the things at the bottom.
4. Now place the pie dish or bowl on top of the water and look again. Can you see any better?

Why?

The surface of a pool of water has bumps and movements that are difficult to see through. (When you put your face in the water, your vision was even worse because your eyes are designed to see not through water but through air.) Placing the glass bowl on the water flattens the water into a smooth surface. Light rays from a flat surface let your eyes focus much more easily.

22

Phantom Candles

PARENTAL SUPERVISION RECOMMENDED
Create a mysterious illusion in the next experiment, and discover how light interacts with a surface to make phantom images.

What You'll Need

- transparent plastic or acrylic plate (1 sq. ft. x ¼″)
- matches
- two matching candleholders, with two candles of equal size (not longer than 8″)
- two narrow books of equal width

Directions

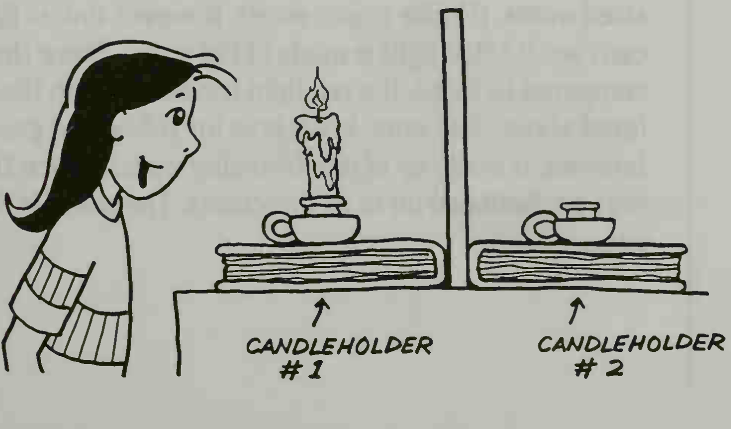
1. Start by placing the two books flat on a table, binder to binder, in a darkened room. Stand the plastic plate between the books.
2. Place one candle (in holder) on each book, about four inches away from the plastic. If there are handles in the holders, line them up so they're facing the same direction.
3. Now light the candles. Standing behind one candle, look through the plastic plate to the other candle. Make sure the candles are lined up.
4. Remove candle 2 from behind the plate, leaving its candleholder behind. A phantom candle appears in the empty candleholder!

Why?

You can see an object only by the light reflected by it. If no light can pass through it from behind, the object will appear solid. If light can pass through it *and* reflect off it, the object will appear ghostlike. In your experiment, the plastic allowed light reflected off of candleholder 2 to pass through it. It also reflected some of candle 1's light back to you, creating a ghostlike image of the candle in candleholder 2. Note: The reflection in the plastic will appear as far *behind* the plastic as the true object is in *front* of it.

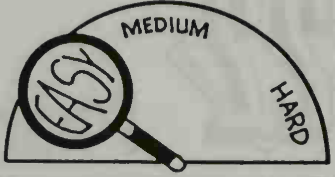
Wonder List

- If you want to create a more dramatic phantom image, place two identical chairs on opposite sides of a glass door, at equal distances from it. Then, holding a candle in the dark, seat yourself in one of the chairs.



23

Why Isn't the Sky Green?



We take for granted that the sky is blue, but why is it so? Why does it change color from dawn to noon to dusk? And why isn't it purple or green, or even colorless? As every good scientist knows, there are reasons for everything.

What You'll Need

- glass fishbowl (or a deep glass bowl)
- water
- flashlight
- two thick books
- measuring spoon
- milk

Directions

1. Fill the bowl with water and set it on a table in a darkened room.
2. Stir in two tablespoons of milk and you have recreated the sky.
3. Place the flashlight on the books about three feet away from the bowl. Shine the light directly into the "sky."
4. Crouch down and look into the bowl at eye level with the light behind you (but not blocked). What color does the "sky" appear?
5. Move slowly around the bowl until you're at the opposite side. Look through the bowl to the flashlight. What color is the "sky" now? It's amazing what a little more distance from the light will do!
6. Try holding the flashlight in your hand near the bowl now. What colors do you see as you move the light around and above the bowl?

Why?

Remember that light behaves like waves in many ways. We can understand why the sky is blue by looking at how ocean waves are affected by obstacles. Think about a wave of water moving on the surface of the water. If the wave hits a rock on the water, two different things can happen: If the rock is much smaller than the wave, the wave doesn't even notice and continues in the same direction almost completely unaffected. But if the rock is the same size or even larger than the wave, the wave bounces off and is thrown in a different direction. This effect is called "scattering."

Scattering is what happens to light in the earth's atmosphere. The air molecules are like the rocks, and the different colors of light are the different-sized waves. (Unlike ocean waves, however, unless light gets scattered, you can't see it.) Red light is made of big waves. Since the air molecules are small compared to these, the red light travels through the air without being scattered about. The same holds true for yellow and green light. Blue light, however, is made up of much smaller waves. When they hit the air molecules, they are bounced off in all directions. The result is that everywhere you look, you see blue.

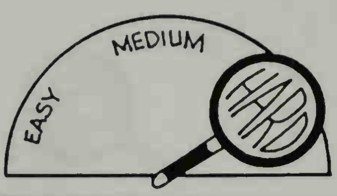
At sunrise and sunset, when the sun is close to the horizon, the light reaching us travels through a greater thickness of atmosphere than when the sun is high overhead, where the air is thinner. When the atmosphere is thick, it contains more dust, air molecules, and water vapor with which to scatter light. The blue light (and green, too!) is scattered so much that we can't see it anymore. But now we are able to see the orange and red light, whose large waves can be scattered by the thick air.

Wonder List

- On Mars, the particles in the air are much bigger than in our atmosphere. So, the longer red waves crash into the air molecules and get scattered about. That's why the Martian sky appears red.

24

Getting Nowhere



PARENTAL SUPERVISION RECOMMENDED

Picture a spinning bicycle wheel. You can usually tell the direction in which it's spinning, but if the wheel is going fast enough, a strange thing happens. The wheel may actually appear to stop or, even more strangely, to spin backward.

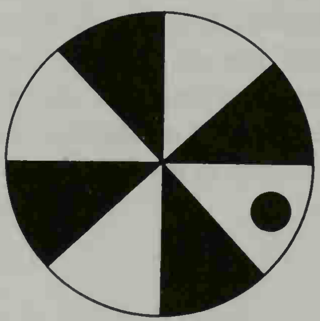
What You'll Need

- heavy white cardboard or matte board (10″ x 10″ or larger)
- one long nail (about 2″ long and thin enough to fit inside spool)
- three small nails
- black felt pen
- piece of board (1 sq. ft. or larger), at least ½″ thick
- scissors
- spool of thread (2″ high)
- ruler
- protractor
- screw
- pencil
- any kind of tape
- string (18″ long)

Directions

1. Using the scissors, pencil, and protractor, cut a circle (5″ diameter) out of the cardboard. Mark the center of the circle.
2. With the ruler, draw four lines through the center of the "wheel" to create eight sections of equal size. Fill in four of the pie-shaped pieces with the black felt pen. Add a black dot to one empty pie piece (A).
3. Tape the thread on the spool in place so it won't unravel. Then poke the long nail all the way through the center of the top side of the wheel. Now drop the nail through the center of the spool (B).
4. Holding the paper and spool in place, nail the three small nails into the spool to secure it in place (C). Turn the wheel so the spool faces up, and the long nail will fall out.
5. Poke the nail through the circle about one-half inch from the outside of the wheel. Feed the string through this hole (C).

Ⓐ



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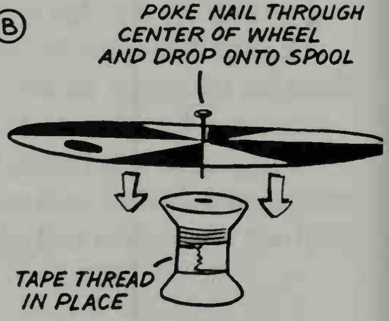


6. Tie a "grip knot" on the wheel side of the string. On the spool side of the string, tie another knot, this one around a screw. (The screw acts as a weight.) Tape the screw in place on the underside of the wheel (C).
7. Drive the long nail through the board, and set the spool on top of it (C).
8. Hold the grip knot and gently turn the wheel around in circles. As you turn it faster and faster, what happens to the pie pieces on the wheel? Experiment with spinning the wheel at different speeds. At certain speeds, why do the pie pieces appear to go backward?

Why?

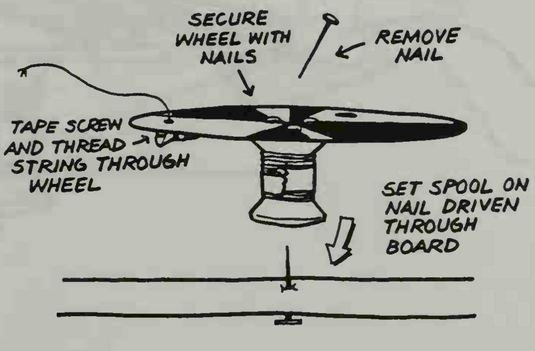
Your brain can perceive (or see) motion only so fast. If an object is moving faster than that, you will only see parts of it. Your brain can observe twenty-four changes in motion per second. Movies are a good example of this. For every second you watch a movie, twenty-four frames whiz by. If there were fewer or more than twenty-four frames, the action would seem unnatural.

As you sped up your spool-wheel, at one point it simply spun too fast for your brain to see. Before then, your brain could observe the full motion of the wheel. But why would the wheel appear to go backward? For one thing, the wheel would have to be going fast enough (say, several cycles per second) so you couldn't follow the black dot as it traveled around it. Then, let's say that the last split-second your brain saw the wheel was when the black dot was pointing toward noon. If the next time you saw the wheel the dot was not clockwise of noon, but, say, at 11 o'clock, the wheel would appear to be going backward. If the next time your brain sees the dot it's at 10 o'clock, then 9 o'clock, and so forth, the wheel will seem to be going backward.

Wonder List

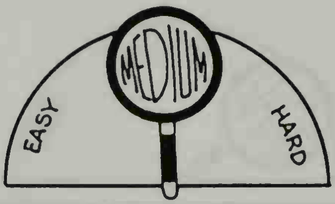
- A strobe light has the reverse effect of the spinning spool-wheel. Instead of giving your brain too much information to perceive, the strobe light, in blacking out portions of information, gives your brain too little to perceive.

Ⓒ


SECURE WHEEL WITH NAILS
REMOVE NAIL
TAPE SCREW AND THREAD STRING THROUGH WHEEL
SET SPOOL ON NAIL DRIVEN THROUGH BOARD

25

Color Wheels



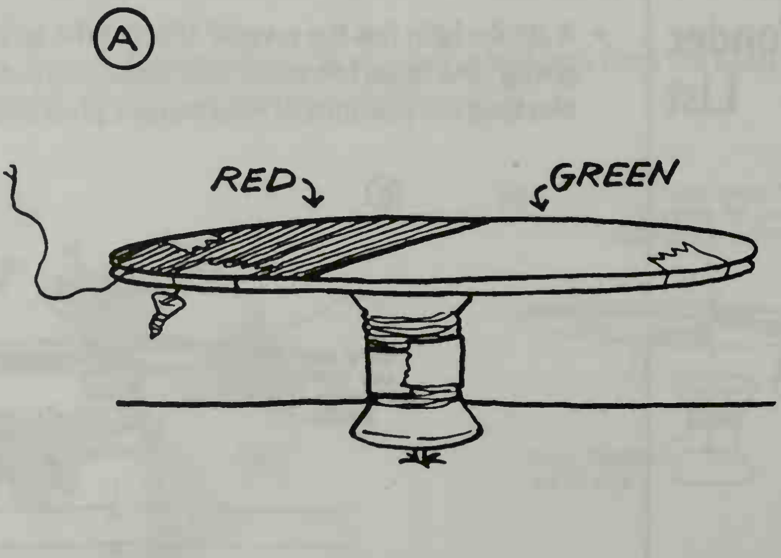
PARENTAL SUPERVISION RECOMMENDED
Now let's examine how your brain *sees* colors. We don't mean in just an ordinary way, but when you set your colors spinning.

What You'll Need

- paints (primary and secondary colors)
- paintbrush
- protractor (or dinner plate for tracing)
- transparent tape
- scissors
- pencil
- white construction paper
- the spool-wheel and board you made in the Getting Nowhere experiment

Directions

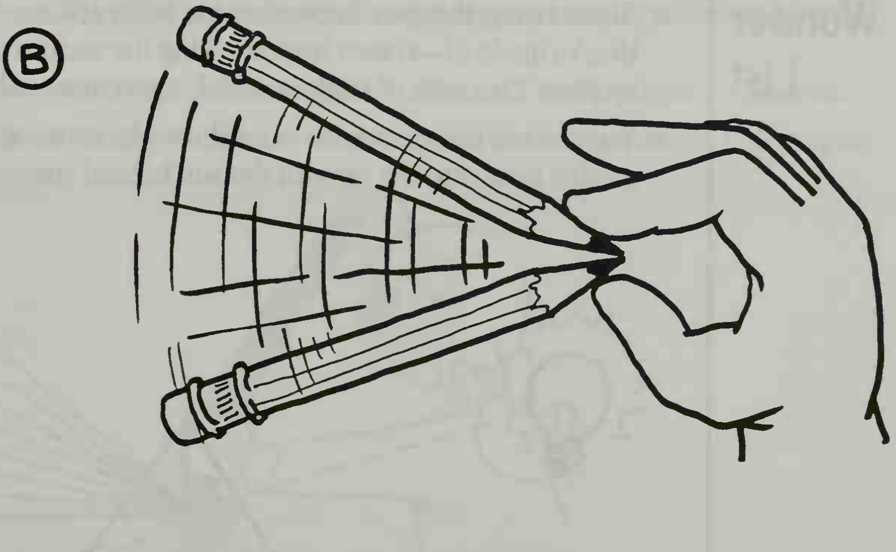
1. Using a pencil, scissors, and a protractor, cut out several circles of white construction paper.
2. Draw lines down the center of your "wheels," separating them into halves.
3. On one circle, paint one half red and the other half green.
4. When the wheel is dry, attach it onto the spool-wheel with the tape. Make sure to put tape on either side of the string, which should come out the side between the two wheels (A).
5. Grab the string and spin the wheel faster and faster. What happens to the green and red?
6. Repeat steps 3 through 5, this time painting a wheel blue and orange, then one yellow and purple. What happens to the colors?



Why?

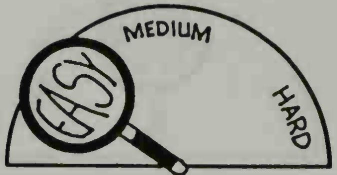
As you learned in Getting Nowhere, when you look at something, your brain keeps a picture of it inside your head for a little while. This is called "persistence of vision." You can see this by grabbing one end of a pencil between two fingers and quickly wiggling it in front of you. If you shake the pencil fast enough, it will appear as if there are two pencils (B). Of course, you know there's only one—the "second" pencil is merely the persistent image inside your head of the real pencil. Your brain hasn't had time to get rid of the first picture before it sees the pencil moved to another position. This is why fast-moving objects appear to blur.

When you turned your color wheel fast enough, your brain didn't have time to get rid of one color before it saw the next color. So, your brain simply combined the two color pictures, just like it combined the two pencil pictures. The interesting thing is that your brain sees rapid, alternating pictures of red and green as white, blue and orange as white, and yellow and purple as gray!



26

Light Dispersion



Centuries ago, Sir Isaac Newton made an incredible discovery: light wasn't white at all, but actually many colors of light that combined to look white. This was a major discovery in the field of optics (the study of light). We know a great deal about our universe through the study of the light spectrum.

What You'll Need

- prism
- sheet of white paper
- lamp (without shade)

Directions

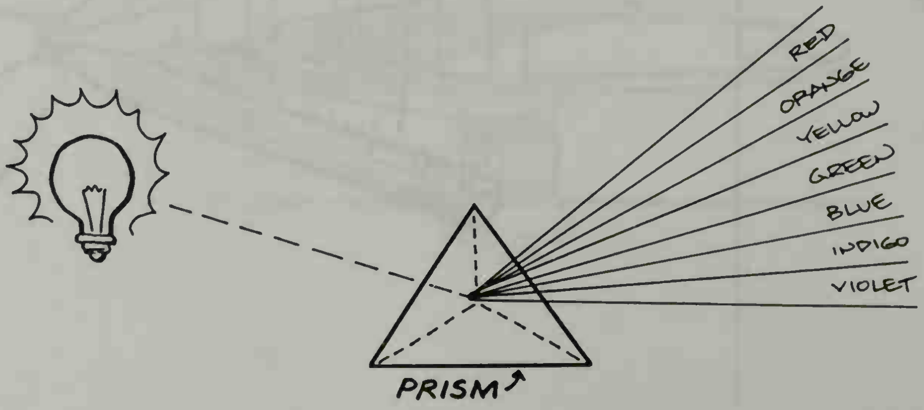
1. Experiment with the prism in normal light by holding it up to your eye and viewing several objects. You'll see that the light reaching your eye from these objects *disperses,* or separates, into colors.
2. Now hold up a piece of paper near the lamp light, and look at its edges through the prism. How many different colors can you see?

Why?

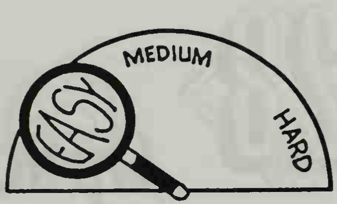
In outer space (in a vacuum), all the different colors in a beam of light travel at the same speed. As a result, they stay combined and are seen as white light. But when light travels through glass, the different colors travel at *different* speeds. One color outruns another, and they begin to separate. As they spread out, they can be seen individually. It's just like running a race. If everyone runs at the same speed, they will stay together. If everyone runs at different speeds, pretty soon the runners are all spread out, just like the different colors of light in a prism.

Wonder List

- Almost everything we know about in outer space—how big stars are, what they're made of—comes from studying the various colors of light given off by stars. This area of study is called "spectrum analysis."
- You can see the spectrum—a rainbow—by spraying a fine mist from your garden hose into the air with the sun behind you.



27 It's the Wave!



We know that white light can split into its various colors, but can it disappear into blackness? (And we don't mean by turning off the light switch!) Read on.

What You'll Need

- nylon stockings (black or another dark color works best)

Directions

1. Take one stocking leg and hold it up to the light as shown. Notice the patterns and waves of light and dark?
2. Stretch the nylon in different directions and see the patterns change.

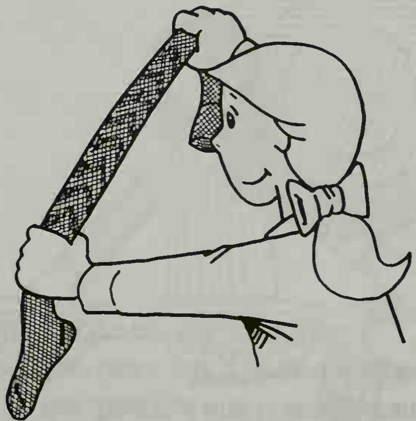
Why?

Many things in nature behave like the waves in the ocean. When two waves smash into each other, they form a bigger wave. If a bump in a wave collides with a dip in the wave, the wave disappears. This "disappearing wave" is easy to understand if you compare it to a hole in the ground. The dirt dug out of the hole forms a mound (bump) next to the hole (dip). The mound is like the crest of the wave, and the hole is like the trough. When a mound meets a hole, the mound fills the hole, and what are you left with?

Light also travels in waves. Just as a bump and dip in the water can make each other disappear, so can two light waves. You can't see the light waves, but you can see how a material affects them. When the light traveled through the nylon mesh, it combined in all these ways: bump to bump, dip to dip, and bump to dip. These interactions are called interference. When a light bump fell into a light dip, the light disappeared—darkness. These are the dark areas you saw. The light areas are where two bumps or two dips combined.

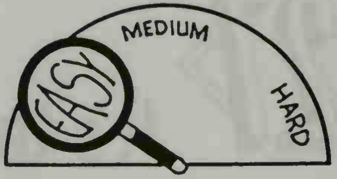
Wonder List

- Two sound waves can cancel each other out and produce . . . silence.
- Interference patterns are used to create three-dimensional holographic images.



28

Optical Illusions



Optical illusions help reveal how your brain works. Sometimes your brain will interpret an unfamiliar image as being familiar, even though it's *mis*interpreting it. That's why optical illusions are fun—you get to catch your brain making a mistake! Look at these illusions and see if you can figure out why your brain mistakes what it sees.

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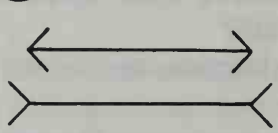

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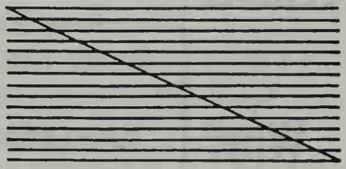

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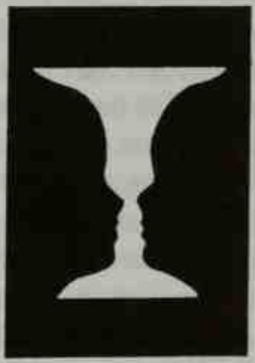

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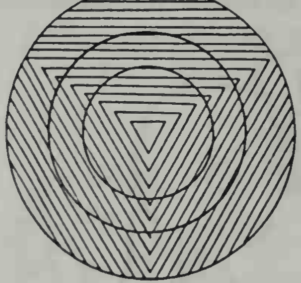

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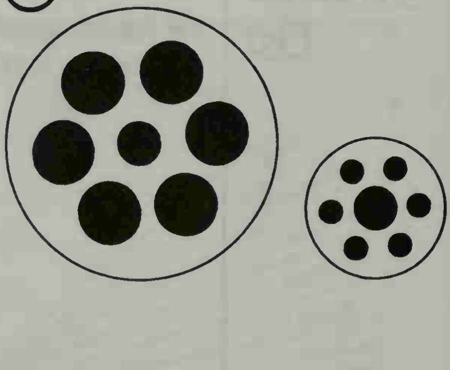


A. Both lines are the same length. B. the diagonal line is straight and unbroken. C. You see either a vase or two faces. D. The concentric circles are perfect circles. E. The two center circles are the same size.

29

What's the Sense of It?

You know the world around you only through your senses. But did you know that your senses can sometimes fool you, giving you a misleading picture of the world? In this experiment, we'll explore the sensation of touch.

What You'll Need

- three large bowls
- ice cubes
- a clock or watch with second hand
- water

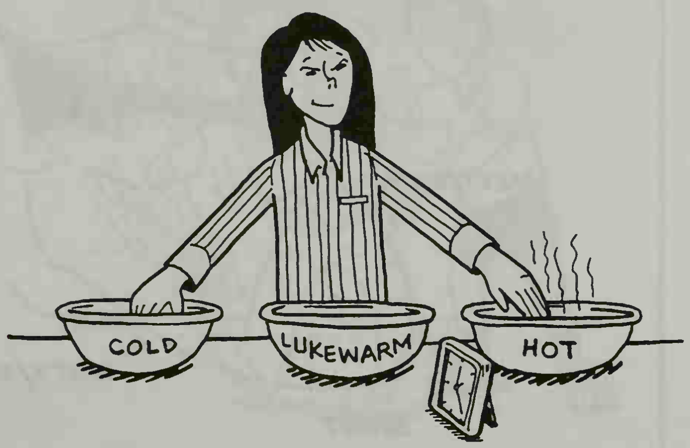
Directions

1. Fill the bowls with water: the first bowl with very hot water (not boiling), the second with lukewarm water, the third with ice water.
2. Dunk your left hand into the hot water and your right hand into the ice water at the same time. Have a partner clock fifteen seconds while you keep your hands fully immersed.
3. Now place both hands into the lukewarm water at the same time. What happens? How would you describe the sensation your left hand feels? What about your right hand?

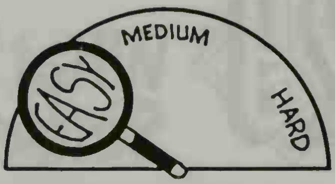
Why?

Sometimes your senses measure something very different than you think they do. For example, you may think that what feels hot has a high temperature or that what feels cold has a low temperature. But your body doesn't measure temperature. (If it did, when you placed your hands in the lukewarm water they would have felt the temperature as the same, but they didn't.) What you feel, instead, is the *change* in temperature and how fast that change is occurring—that is, how fast you receive or give away heat energy.

Receiving heat feels hot, and the faster you receive it, the hotter it feels. Giving heat away feels cool, and the faster you give it away, the cooler it feels. Since heat always travels from the hotter object to the cooler object, your cold right hand received heat from the lukewarm water, so it felt warm. Your warm left hand gave away heat to the lukewarm water, so it felt cool.



30 Sweet-and-Sour Science



Do you know where your sweet, salty, sour, and bitter taste centers are? Let's explore the sense of taste and answer this question.

What You'll Need

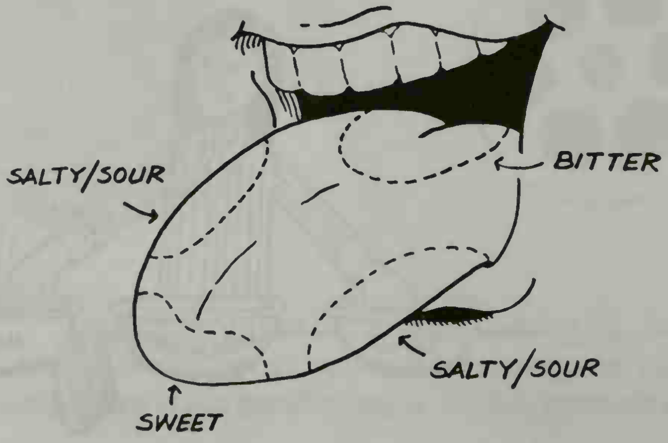
- sugar
- instant coffee grains
- vinegar
- measuring spoons
- cap from vinegar bottle
- table salt
- plate

Directions

1. Pour your ingredients into separate piles on a plate. You'll need a quarter teaspoon each of salt, sugar, and coffee, and a capful of vinegar.
2. Wet your finger, dip it into the salt and place your finger in the center of your tongue—not too far forward and not too far back. Keep your finger in place and your mouth open (closing your mouth will spread the taste to other parts of your tongue). Can you taste anything?
3. Now move your finger to a salty taste center. What happens now?
4. Repeat steps 2 and 3 with the sugar, coffee, and vinegar. (For best results, rinse your mouth out before moving on to a new taste.) When experimenting with sugar, move your finger to the tip of your tongue; with the coffee, to the back of your tongue; and with the vinegar, to either side and slightly back. Did you taste anything by touching the center of your tongue? What about when you moved your finger and struck a taste center?

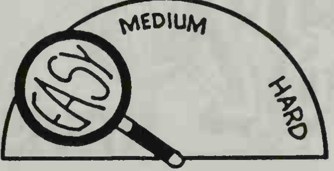
Why?

Did you know that all tastes—from banana to barbecued chicken to cheddar cheese—are a combination of any or all of the four "primary" tastes (remember the Reflections on Color experiment)? You can test this by creating a combo-taste. Dip one finger into the sugar and the other into the vinegar. Now place both fingers in your mouth at the same time and close your mouth. Can you taste the sugar and vinegar mixing? Does it remind you of a Chinese dish you had recently? Presto—sweet-and-sour finger!



31

Tickle Your Feet



Why can't you tickle yourself? If someone else tickles you, why do you become unbearably ticklish? The answers are not as easy as you think!

What You'll Need

- a ticklish partner

Directions

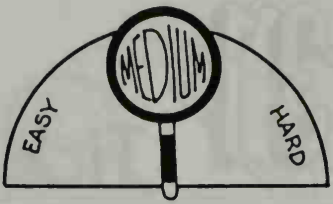
1. Working with a partner, try to tickle yourselves in your most ticklish spots. Not much fun, is it?
2. Now it's time to tickle each other for a minute or two. If you were paying attention, your partner identified his or her tickle "hot spot," so . . . one, two, three, go!
3. After the two of you have recovered, try to explain why you couldn't tickle yourself but your partner could. Any ideas?

Why?

One reason for not being able to tickle yourself is physical. When you tickle yourself, your brain has two streams of touch sensations to deal with: those coming from the area you're tickling, and those coming from the hand doing the tickling. When *someone else* tickles you, your brain has only one stream of sensations to process. Your brain can concentrate on the tickling sensations alone. But believe it or not, tickling has more to do with psychology than with your sensation of touch. When someone else is about to tickle you, there are a few silly seconds of anticipation before the tickling begins. This anticipation makes your brain focus attention on the tickling sensations you're about to experience. You "tune in" more, so you actually have a heightened experience of the sensations.

32

Invisible Ink



PARENTAL SUPERVISION REQUIRED

Treasure maps and scientific formulas, escape plans and code secrets—you can't let just anybody see these things. No, for these kinds of schemes, you just have to have invisible ink!

What You'll Need

- bottled lemon juice
- paintbrush
- very long stick matches
- notebook paper

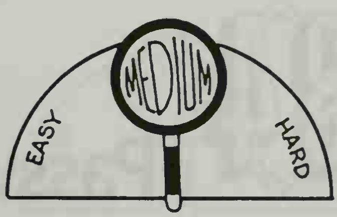
Directions

1. Make up a secret message for your best friend. Then, with the paintbrush and lemon juice, paint your message on the paper.
2. Set the paper aside to dry (sunshine will speed up this process).
3. When the message is dry, your friend can decode it. (It's a good idea to decode the message over a sink.) While one person holds the paper, the other person should light the match and sweep it in small circles about an inch under the paper. Be careful not to hold the match in one place for more than a second. After a few moments, the secret message will appear.

Why?

The lemon juice contains a chemical that burns much more quickly than paper. So, before the paper has a chance to heat and ignite, the lemon juice burns, revealing the secret message.

33 IC3D



PARENTAL SUPERVISION RECOMMENDED

Your brain is constantly trying to make sense of the information it receives. In the next experiment, you will be able to *see* your brain trying to sort out confusing visual images.

What You'll Need

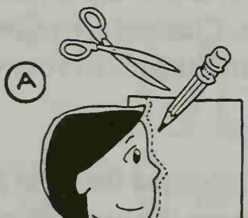
- 8½″ x 11″ white construction paper
- ruler
- colored pens
- various household items with a circular edge, varying in size
- scissors
- 8½″ x 11″ sheet of paper
- a partner

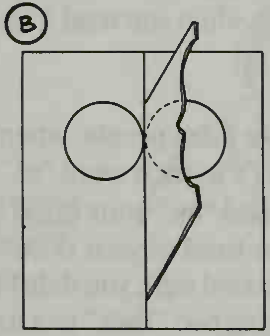
Directions

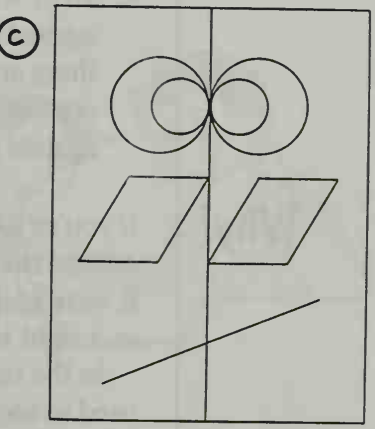
1. First, create a "vision separator" for yourself. Hold the construction paper against your face and have a friend outline your profile (A).
2. Cut along the line, and you'll have a piece of paper that fits over your forehead, nose, and mouth that separates your vision.
3. Now draw a vertical line down the center of the sheet of paper.
4. Using two different-colored pens, draw two circles (the size of cola cans) on opposite sides of the line (B).
5. Place your vision separator along the vertical line of the paper, fit your profile into the separator, and look at the circles. What happens to them?
6. This is one you can play around with. Experiment by drawing the different shapes shown in C, or make up your own.

Why?

To determine an object's position correctly, your brain requires both of your eyes (stereoscopic vision). The vision separator took away your brain's ability to determine position. Because the images *looked* the same, and their position was unclear to your brain, your brain thought they were a single image. That's why it tried to fuse them.

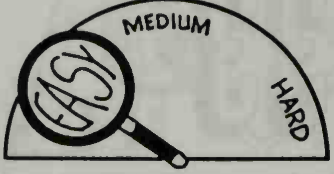






34

Password



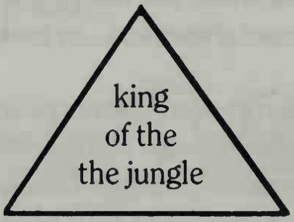
Your mind favors the familiar. That is, your brain sees what it is used to seeing. It loves patterns. For example, as you learned to read, your mind became familiar with common sentence structures and sounds. But your mind can trick you, and in the following experiments, we'll show you how. After you've played these word games, try them on a friend or family member.

Directions

1. Read the following sign out loud.

A frivolous feline of Fenwith,
Donned her finest of furs to fetch men with.
First the frog of St. Fly
On the Fourth of July,
Then the fish of Fifeshire on the Fifth.

2. Now count the number of f's in the limerick (before you read further). How many were there? Did you count sixteen? Seventeen? Would you believe there are actually twenty f's in the rhyme? Which ones did you miss?
3. Next read the following sign out loud.


king
of the
the jungle

4. Write what you read on a piece of paper. Now compare what you wrote against the sign. Are they the same? Look very carefully and you'll see that there are two "the's" in the phrase. Chances are you missed the second one both when you read it aloud and compared your written version against it.

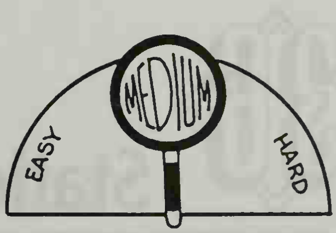
Why?

If you're like most people, when you counted the f's in the first sign, you missed the f's in each word "of." Because the word is pronounced as though it were spelled "ov," your mind literally did not see the f, even though it was right in front of your nose.

In the second sign, you didn't see the second "the" because you're not used to seeing two "the's" in a row in English. In fact, your brain recognizes a different pattern: only one "the." So your mind skips right over the second "the"!

35

Know Your Way



PARENTAL SUPERVISION RECOMMENDED
Next time you go backpacking or hiking, bring a needle, a magnet, and matches. If you ever become lost and no one has a compass, you'll be a hero!

What You'll Need

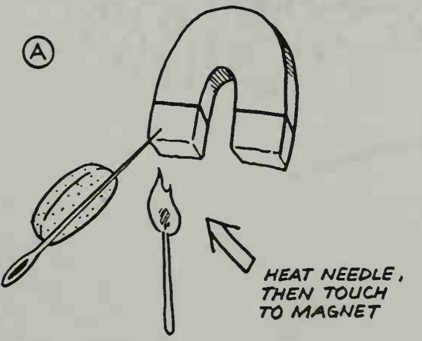
- cork (about ½″ wide)
- horseshoe magnet (6-lb pull)
- knife
- match
- needle
- pencil

Directions

1. Cut off the bottom end of your cork (like you're slicing a carrot). Then cut a notch down the center of the flat side of your cork chip.
2. Press the needle lengthwise into the notch.
3. Light a match and heat one end of the needle until it is hot. Then touch it to your magnet (A).
4. Dip the needle into the water to cool it, then drop your cork chip into the center of the bowl of water, with the needle side down. What happens? You've made a compass!
5. Using a pencil point, rotate the needle away from its position, then let go. Your compass will spin back to north. Hold a magnet around and above the compass and watch what happens (B).

Why?

Heating the needle makes it easier for the little north and south poles inside the needle to line up with the magnet's poles. When it cools, the poles stay lined up, leaving the needle magnetized.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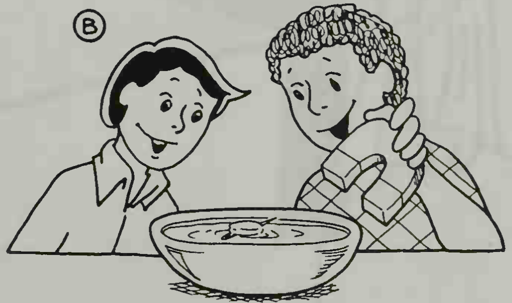
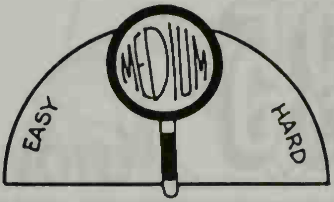
HEAT NEEDLE, THEN TOUCH TO MAGNET



36

Static Charge



Almost everything you experience results from a quality of microscopic particles called "charge." Charged particles are responsible for the strange attractions and repulsions between objects. Moving charges create magnetic forces, while static charges create electric forces.

What You'll Need

- a plastic rod (acrylic or plexiglass, 1 ft. long x ½″ wide)
- a silk scarf
- sheet of notebook paper
- rubber glove

Directions

1. Tear up the sheet of paper into tiny bits. Spread the bits on a table so they're not touching each other.
2. Put a rubber glove on one hand and hold the plastic rod with it. With the other hand, rub the silk scarf vigorously up and down along the rod for a few seconds.
3. Hold the rod close to the paper bits. What happens? Move the rod in circles over the paper bits and watch them dance and fly!
4. Experiment by moving the paper bits nearer and farther apart on the table. Don't forget to rub the rod now and then with the silk.

Why?

When it comes to charged particles, it's true that opposites attract. A negative charge attracts a positive charge, and vice versa. When it comes to *same* charges, though, the attraction is over. Two negative charges repel (push away) each other, as do two positive charges.

The plastic rod and silk were chosen for this experiment because of their natural qualities. When you rub the plastic with the silk, the plastic strips off negatively charged particles (electrons) from the silk. Thus, by rubbing the rod you are "charging" it. The rubber glove prevents the charged particles from coming off the rod onto your hand.

When you approach the paper bits, the negative charges on the rod attract the positive charges in the paper. The paper leaps up to the rod (so fast, though, that you have to watch carefully to see it). Once the paper and rod touch, however, the negative charges on the rod rapidly leak onto the paper. (Can you guess why? Because the negative charges on the rod are trying to get away from each other!) Some of the paper immediately becomes negatively charged. Given that same charges push each other away, what would you expect to happen next? The paper and rod repel each other. The rod is too heavy to go anywhere, but the paper bits are light enough to shoot away.

Wonder List

- Try holding up the charged rod to your hair. It's also fun to go into a dark room and hold the tip of the charged rod to your finger.

37

Creating a Force Field

EASY MEDIUM HARD

What do magnets and electricity have in common? Plenty! They're different aspects of the same physical structure. Create a magnetic field and see.

What You'll Need

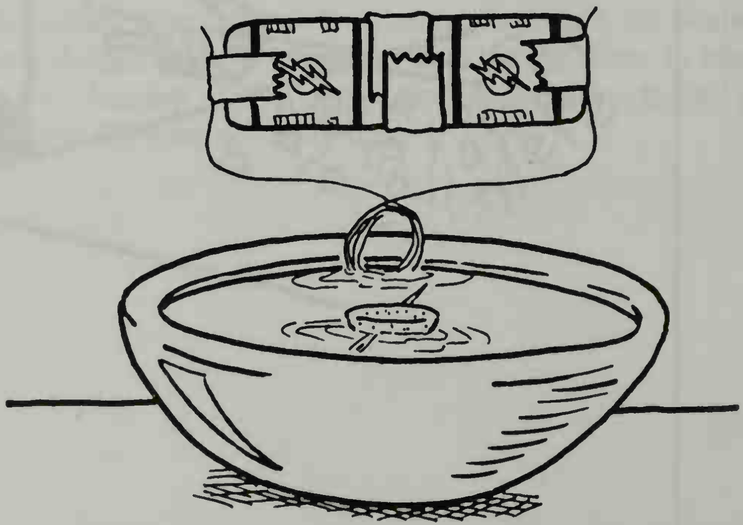
- two D-size batteries
- the compass you made in Know Your Way
- insulated wire, 20″ long (22-gauge "bus" wire or larger, stripped ½″ on either end)
- tape
- bowl of water

Directions

1. Tape the two batteries together, positive end to negative end.
2. Coil the center of the wire around your finger and twist it once. Leave about three inches of wire free at either end, and tape these ends to the metal ends of the batteries.
3. Fill a bowl with water and drop in the needle compass you made.
4. Dip the loop of wire into the water and watch what happens to your compass. This time you've made a magnetic force field!

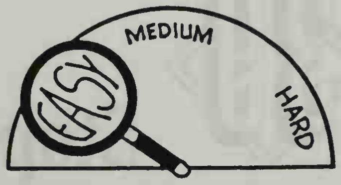
Why?

In your experiment, the battery pushed charged particles (electrons) through the coil of wire. These moving electrical charges created a magnetic field, which could affect the compass you made. In a simple magnet, this is exactly what happens. The charged particles move within the iron and create a force field that attracts metal objects.



38

The Human Antenna



PARENTAL SUPERVISION RECOMMENDED

What You'll Need

- television set
- screwdriver
- a human body (you'll do nicely)

Directions

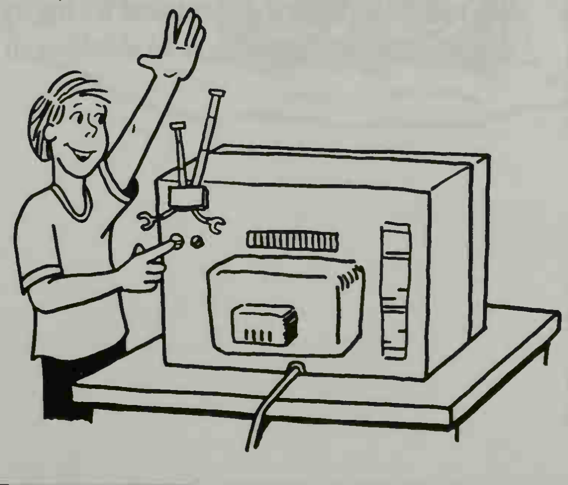
1. Turn your television on and tune in to a station with clear reception.
2. Your television set has two antenna connections labeled "VHF" (which stands for very high frequency) on the back. Using the screwdriver, loosen these connections and detach the antenna wires. What happens to the picture on the screen? Your TV reception should be distorted and snowy.
3. Have a friend or parent watch the screen as you perform the next step. Extend your left arm out to the side, and, using the index finger of your right hand, touch one of the two connections.
4. Now switch places with your partner and repeat Step 3. What happens to the picture when your partner touches the screw?

Why?

An antenna is a device that collects electromagnetic signals and then sends them to an "electronic box" to be decoded—in this case, your television set. The larger the antenna, the more signals it can collect. The screw on the back of your television set is too small to collect many of the signals, so the reception is poor. Your body, however, can collect many more signals. By touching the screw, your body can then send them to the television's electronics, resulting in a much better picture.

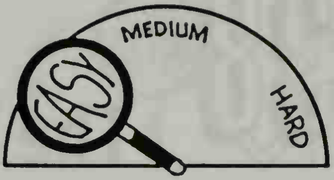
Wonder List

- In astronomy, why are bigger telescopes better?
- Did you know that your eye behaves like a miniature antenna? It collects electromagnetic information (in the form of light), and the pupil, by getting larger or smaller, controls the amount of information coming in.



39

Stop the Music



All around you at every moment there is information in the air waiting to be decoded. Music and pictures from faraway lands, tales of distant galaxies, the life and death of stars—all this and more exist in the form of electromagnetic waves, the kind of waves picked up by a radio, television, or telescope. Most of the time, this wave energy goes unnoticed. But with the right kind of "magic box," you can explore new worlds. In the next two experiments, we will explore some of the properties of these waves, and we'll answer two questions concerning this invisible realm: Is it ever possible to escape these mysterious waves? Can the waves really travel through you?

What You'll Need

- a transistor radio (battery operated)
- aluminum foil

Directions

1. Turn your radio on and tune it to a station that has a clear signal.
2. Now tear a piece of aluminum foil long enough to completely wrap the radio, including the antenna.
3. Sit the radio on top of the foil, then slowly raise the sides of the foil until they meet and overlap above the radio. What happened to the reception? Why did the radio stop playing?

Why?

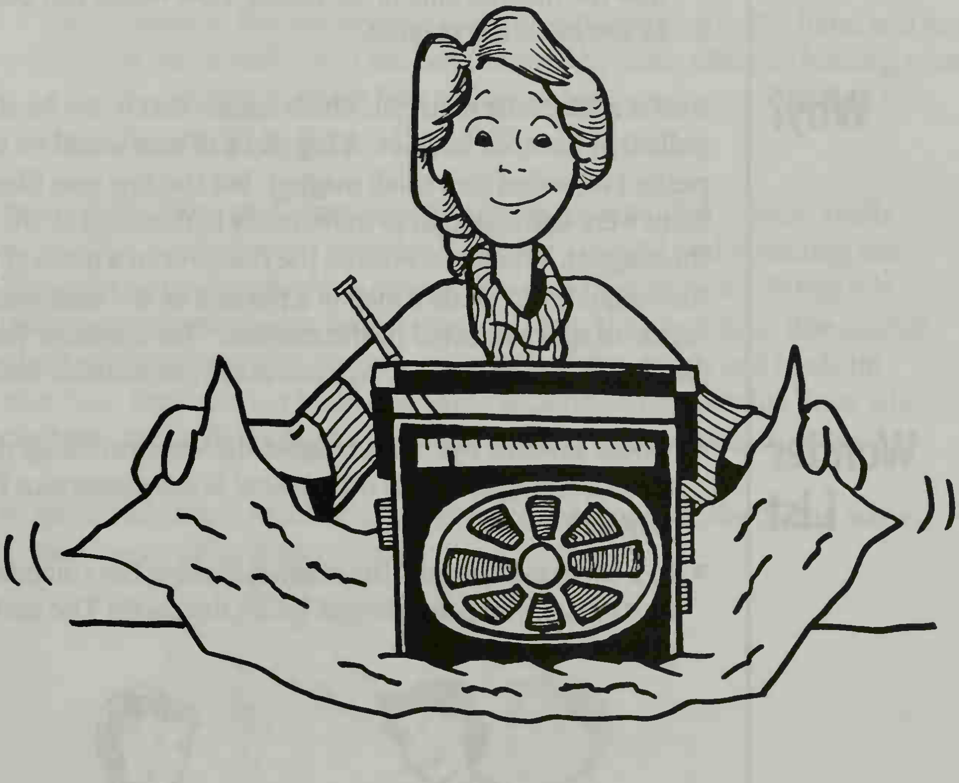
A radio is a "magic box" that selects particular waves out of the shower of electromagnetic waves around us. One way to shield out radio waves is to surround the radio with a conductor (a metal, such as the aluminum foil). The charged particles in the conductor move around in response to the waves to neutralize them. When the waves are neutralized, your radio suddenly has no more information to decode.

By the way, have you ever noticed that plug-in radios don't have antennas? That's because the cord acts as an antenna. Signals from space can reach your radio through the electrical wiring in your home into the radio cord. To "stop the music," you'd have to shield your entire home!

Wonder List

- If people from another planet were trying to communicate with us, what kind of "magic box" would we have to build to hear them?*
- Signals reaching us from distant galaxies and stars allow us to see back in time—wow!

*This question is too fascinating to leave unanswered. As a matter of fact, scientists have developed a superhuge radio telescope for just the purpose of "hearing" signals from other planets. The program is called the Search for Extra-Terrestrial Intelligence, or SETI for short.



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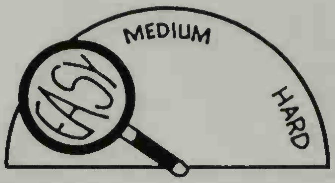
The Invisible Made Visible



You will see mysterious magnetic forces at work in this experiment.

What You'll Need

- horseshoe magnet (6-lb pull)
- sheet of heavy construction paper or thin cardboard
- iron filings
- a partner

Directions

1. It's best to work over a table on this one. Start by holding the construction paper horizontally with one hand.
2. With your other hand, hold the magnet underneath the paper with the end of the horseshoe facing up.
3. Have a partner slowly pour the iron filings onto the paper in a sweeping fashion. Notice the very particular pattern the filings fall into.
4. Slide the magnet all around the underside of the paper. Carefully observe how the magnet affects the filings. How would you describe their behavior as you move the magnet?

Why?

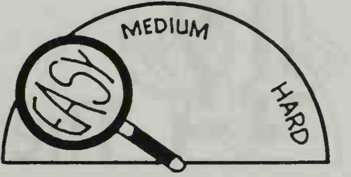
Iron is a magnetic material, which means that it can be affected (pushed or pulled) by another magnet. A big piece of iron would be too heavy to be pushed or pulled by a small magnet, but the tiny iron filings in your experiment were light enough to move easily in response to the magnetic forces of the magnet. When you poured the filings onto a piece of paper held close to the magnet, you made a map of a portion of its "magnetic field"—that is, the region of space affected by the magnet. This magnetic field is usually invisible, but by pouring the filings you made the invisible visible!

Wonder List

- Would sawdust react to a magnet the way iron filings do? Why are some materials magnetic and others not? What mysterious things go on inside a magnet?
- In a compass, where is the magnet making the compass needle point north? Can you guess what it is? It's the earth! The earth happens to be a gigantic magnet.

41

Hot Socks



Have you ever wondered why people wear light-colored clothes in the summertime? Did you ever stand barefoot on a hot asphalt playground and then run like mad to find relief on the white lines? In the following experiment, you will observe and understand why black heats up in the presence of light.

What You'll Need

- a pair of white socks
- a pair of black socks
- a bright lamp, with removable shade (optional)

Directions

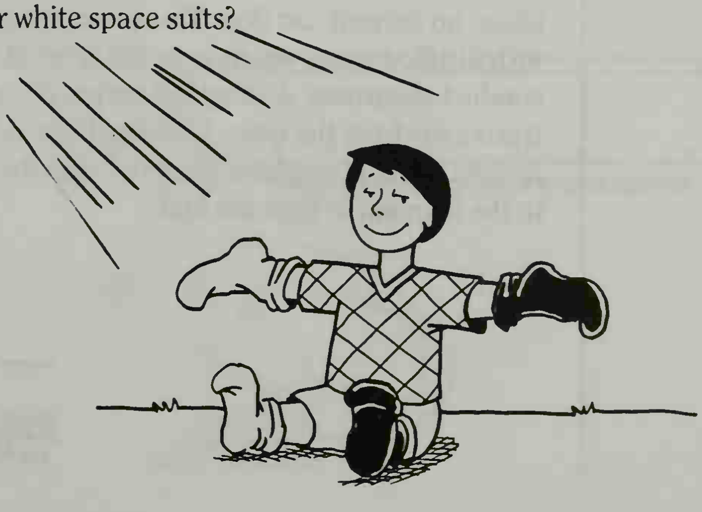
1. You'll need a warm sunny day for this one (but a strong lamp will do if a sunny day refuses to appear). Start by putting your black socks on one hand and foot, and the white socks on the other hand and foot.
2. Find a spot where the sunshine is clear and strong, sit in a comfortable position with your feet stretched out, and read about some of the other experiments in this book. Notice anything happening to the hand and foot with the black socks on? (You can achieve the same effect by holding your sock-covered hands about four or five inches away from a 100-watt light bulb. Be sure not to stare at the light!)

Why?

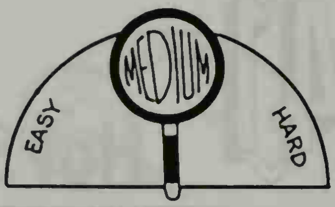
In the Reflections on Colors experiment, we showed that "black" really means that a substance is absorbing all colors of light and reflecting none. The light being absorbed has energy (it comes from the sun). When it is collected, this energy can heat things up. Thus, the black sock (the asphalt, black clothing, etc.) absorbs and collects the light energy and heats up your foot. On the other hand, the white sock (the white painted lines, white clothing, etc.) reflects most of the light (and its energy) away from you.

Wonder List

- We usually think of outer space as extremely cold, so why do the astronauts wear white space suits?



42 The Light Barrier



We know that electric current flows through metal, but will it flow through water? You can rig up a flashlight to answer that question.

What You'll Need

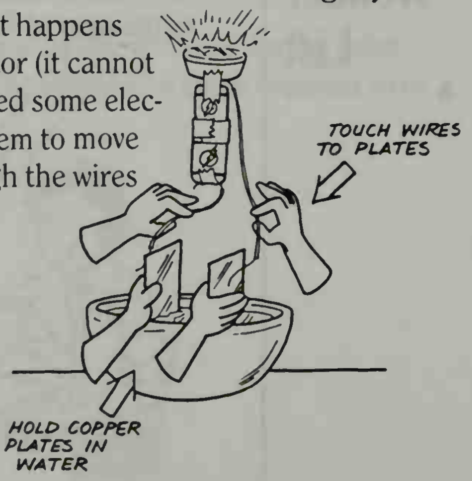
- flashlight
- two 10″ pieces of insulated wire (22-gauge)
- clear glass bowl
- distilled water
- salt
- measuring spoons
- a partner
- tape
- two copper plates

Directions

1. Unscrew and remove the flashlight lid and take the contents out. Tape the two batteries together (positive end to negative end).
2. Have an adult strip ½″ of the insulation off both ends of both wires.
3. Tape one wire end to the negative end of your two batteries. Tape another wire end (from the second piece of wire) to the circle of metal (usually copper) in the light bulb piece.
4. With a long piece of tape, attach the flashlight bulb to the positive battery end as shown. Test that your flashlight works by touching the two free wire ends together. (It's okay to touch these exposed ends; not enough current is traveling through them to do any harm.)
5. Have a friend hold the copper plates in the bowl. Now touch the free wire ends to the plates. Does your flashlight flash on?
6. Add salt slowly and watch what happens.

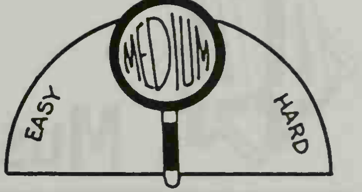
Why?

A material allows electric current to flow (or conduct) when there are charged particles (electrons) inside it that are free to move. In a normal light bulb, for example, the electrons in the bulb's tiny wire (called the filament) can flow easily. This flow heats the filament until it glows white hot and the bulb shines. However, when the electrons inside a material are held tightly in place, no current can flow. This is what happens with distilled water, which is an insulator (it cannot conduct electrons). Adding salt stripped some electrons away from the water, allowing them to move around the copper plates, then through the wires to the filament to light the bulb.


TOUCH WIRES TO PLATES
HOLD COPPER PLATES IN WATER

43

Don't Take Sides



PARENTAL SUPERVISION RECOMMENDED

We usually think of objects as having at least two sides. For example, a piece of paper has a front and a back, and a loop has an inside and an outside. Do you think it is possible for something to have only one side? We're going to make the famous Möbius strip (named for its inventor) and see.

What You'll Need

- sheet of construction paper
- scissors
- pen, pencil, or colored marker
- ruler
- transparent tape

Directions

1. Cut a strip of paper that is 1″ wide and 10½″ long.
2. With the ruler and pen or pencil, mark off sections on the strip of paper. Your first mark should be ¼″ from the left end of the strip. Draw a vertical line through it. From there, tick off 1″ increments until you reach the other end of the strip, where you'll have ¼″ remaining. There, draw another vertical line (A).
3. Now number your inches 1 through 10 as shown. Take the bottom of the strip and flip it up and over to the other side of the strip.
4. Repeat steps 2 and 3, this time numbering the inches from 11 to 20.
5. Now, holding the ends of the strip, twist it once, then join the ends. Overlap the ends exactly ¼″ and tape the ends in place on both "sides" (B).
6. Voilà! You've just created a loop with only one side. How did you do it? If you don't believe you've got a one-sided loop, count the numbers on your strip starting with 1. When you reach 11, the opposite side of your strip, you'll find no flipping is required to keep counting to 20.

Wonder List

- Can you think of anything else with just one side?*

*Neither can we.

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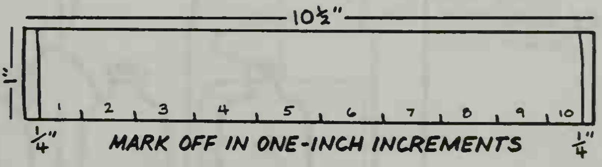

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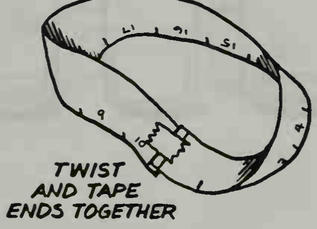
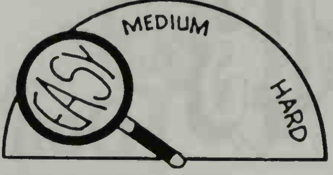

17
16
15
9
10
4
TWIST AND TAPE ENDS TOGETHER

44

Musical Bottles



Have you ever wondered why the tuba, with its booming voice, is such a large instrument, and why the piccolo, with its tiny voice, is such a small instrument? What does sound have to do with size? Let's see. . . .

What You'll Need

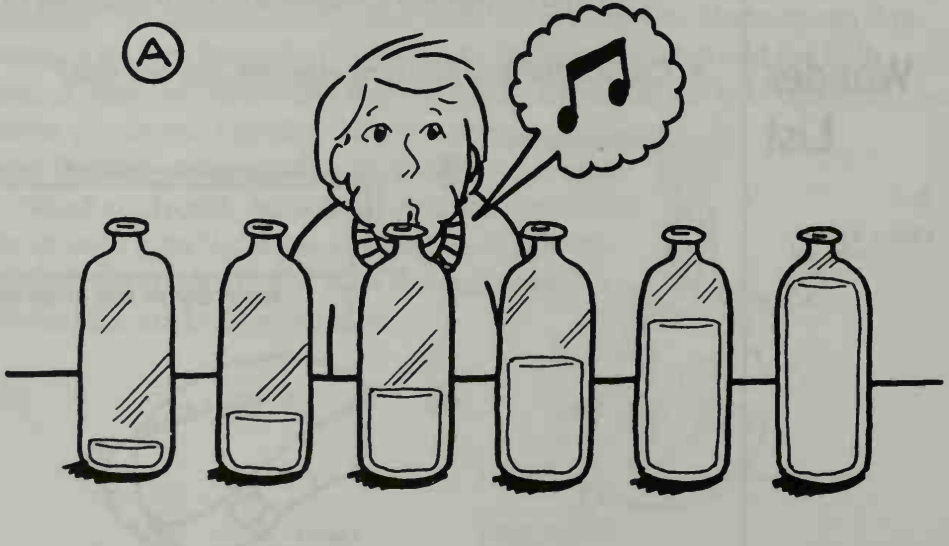
- six empty glass bottles (same size)
- water

Directions

1. Fill the bottles with varying amounts of water, from nearly empty to nearly full. Then line the bottles up as shown (A).
2. Blow across the top of each bottle, one by one, starting with the bottle with the least water. What happens to the sound pitch as you move from bottle to bottle?
3. Now repeat your music-making, this time moving fast as you blow across your row of bottles in one breath.

Why?

Sound is actually vibrations, or waves, in the air. The faster the waves vibrate, the higher the sound pitch. The slower they vibrate, the deeper the sound pitch. How long or short the waves are has to do with how fast or slow they vibrate. The rapidly vibrating, high-pitched waves are short, while the slowly vibrating, low-pitched waves are long. If the waves have a large space to vibrate in, they will be longer than if they have a small space to vibrate in.

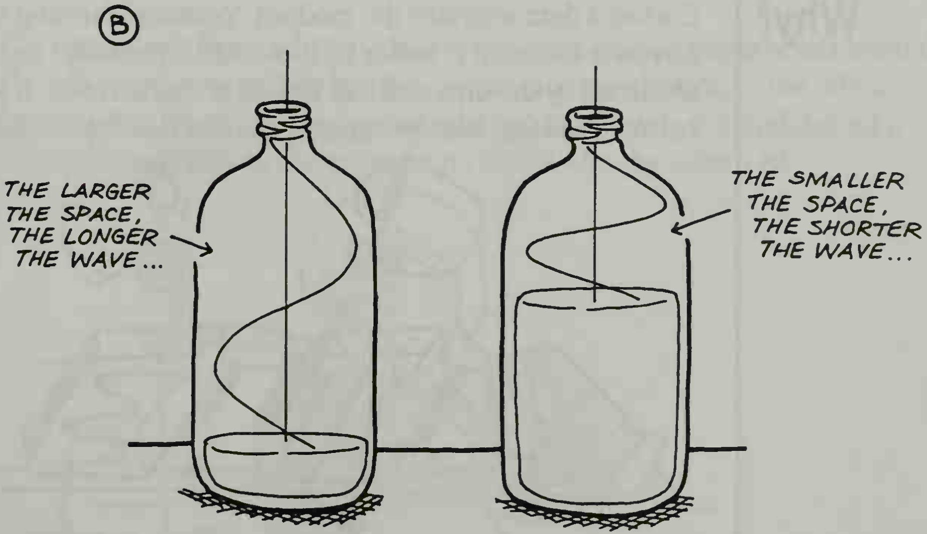


A good way to see this is by taking hold of one end of a garden hose (leaving the other end attached to the faucet) and shaking it up and down. When you shake the full length of the hose, the vibrations in it are slow and long. (If the vibrations were sound, the hose would have a deep voice!) When you shake a shorter length of hose (say, shorter by ten feet), you'll see that the vibrations are faster and shorter. (Here the hose would have a higher voice.)

This is exactly what happened in your musical bottles. The larger the space in which the air could vibrate, the longer and slower were the vibrations (B). So, the deepest sound came from the bottle with the least amount of water and the most air. The smaller the space in which the air could vibrate, the shorter and higher were the vibrations (B). So, the highest sound came from the bottle with the most water and the least air.

Wonder List

- Compare the sounds made by a bottle being filled with those of a bottle being emptied. The "glug-glug" sounds of the first will start low and end high. And of the second?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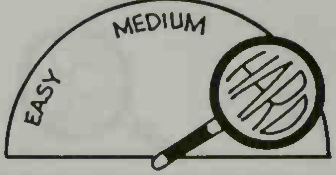
THE LARGER THE SPACE, THE LONGER THE WAVE...
THE SMALLER THE SPACE, THE SHORTER THE WAVE...

45

Learning Topsoil Conservation



PARENTAL SUPERVISION RECOMMENDED

Before they knew that topsoil was the most valuable soil for agriculture, farmers used to let topsoil wash away. Much fertile land was destroyed. You can see for yourself how this might have happened by comparing an old farming method with a new one designed to conserve topsoil.

What You'll Need

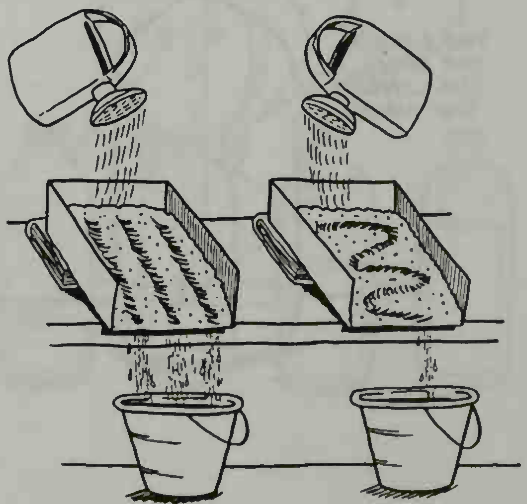
- two half-gallon milk cartons
- two books (or pieces of wood) each about an inch thick
- scissors
- two sprinkling cans (or pitchers)
- two buckets
- dirt or potting soil
- ruler
- a partner
- water

Directions

1. Cut off one side and the top of the two milk cartons. Then cut the remaining sides and bottoms so they're four inches high.
2. Fill your cartons with dirt and shape it into mounds that taper down at the open end of the carton. Set the cartons at the edge of a table, the back ends on books, and place the two buckets below to catch dirt and mud.
3. In carton 1, furrow three parallel lines down the length of the dirt mound. In carton 2, furrow one winding, continuous line.
4. Now your miniature "farms" are ready for a rainstorm. With a partner assisting you, simultaneously trickle about a pint of water from the sprinkling cans into both cartons. Which "farm" holds the most water?

Why?

Carton 2 demonstrates the modern "contour" farming method. Since the furrow is longer, it is better on two counts: the water has more time to be absorbed by the dirt, and less topsoil is washed away. If you lift both cartons, carton 2 will feel heavier because the dirt was able to absorb more water.



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Super Sleuth

EASY MEDIUM HARD

Here's an experiment that will let you play detective and teach you something about a very important tool in crime investigation—fingerprinting.

What You'll Need

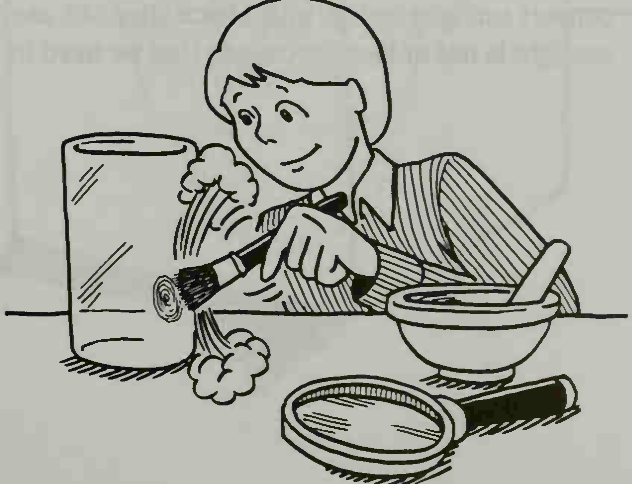
- one teaspoon fine carbon powder (if necessary, a piece of charcoal ground up with a mortar and pestle or hammer will do)
- mixing bowl and spoon
- a fine-haired cosmetic brush
- transparent tape
- white paper
- ceramic plate or bowl
- one teaspoon baking soda
- magnifying glass

Directions

1. In a mixing bowl, combine the baking soda and carbon and mix thoroughly.
2. Now you get to play international jewel thief and leave your fingerprints behind. A ceramic plate or bowl works well for this. (By the way, newly washed hands will not leave the best of prints behind.)
3. With your magnifying glass, inspect for fingerprints. Find anything?
4. Now dip the cosmetic brush into the carbon mixture and *very lightly* dust the ceramic surface. Inspect the area with your magnifying glass. Now what do you see?
5. Place a piece of tape over the fingerprint to "lift" it. Rub the tape gently, then place the tape on a piece of white paper. You should have a close-to-perfect fingerprint for your crime files. Make fingerprints of several people and line them up to compare.

Why?

The natural oils in your hands stick to surfaces, leaving fingerprints behind. The oils aren't very visible, but the carbon mixture clinging to the oils is. Since no two fingerprints are alike, when a set of prints is found during a criminal investigation, there can be no doubt who the culprit is!



47

Show Me the Light

PARENTAL SUPERVISION RECOMMENDED
What will a plant do when deprived of most of its sunlight? Like all living things, it has to adapt to its new environment. In the following experiment, you will see for yourself what we mean.

What You'll Need

- a syngonium "arrow leaf" plant from your local nursery
- scissors or knife
- cardboard box, tall enough to cover the plant without bending the leaves
- sheet of notebook paper
- pen or pencil

Directions

1. First cut a 3″ square "window" in one side of the box.
2. Now find a sunny spot indoors where you can leave your plant undisturbed for several days. Carefully observe the position of your plant's leaves. In which direction are they facing? They should be facing all different directions. Note the information on the paper, which you can call your "Helio Log" (*helio* in Greek means "sun").
3. Now place the box over the plant. Note on the log the date and time you covered the plant as well as the direction the window is facing. Keep your plant covered at all times, except for the few moments when the syngonium may need watering. No peeking!
4. Here you get a break from this experiment. Go try the next experiment—it's fun!
5. After approximately 48 hours, uncover your plant. Notice anything different about the leaves? How and why have the leaves shifted direction? Record your observations in your Helio Log.

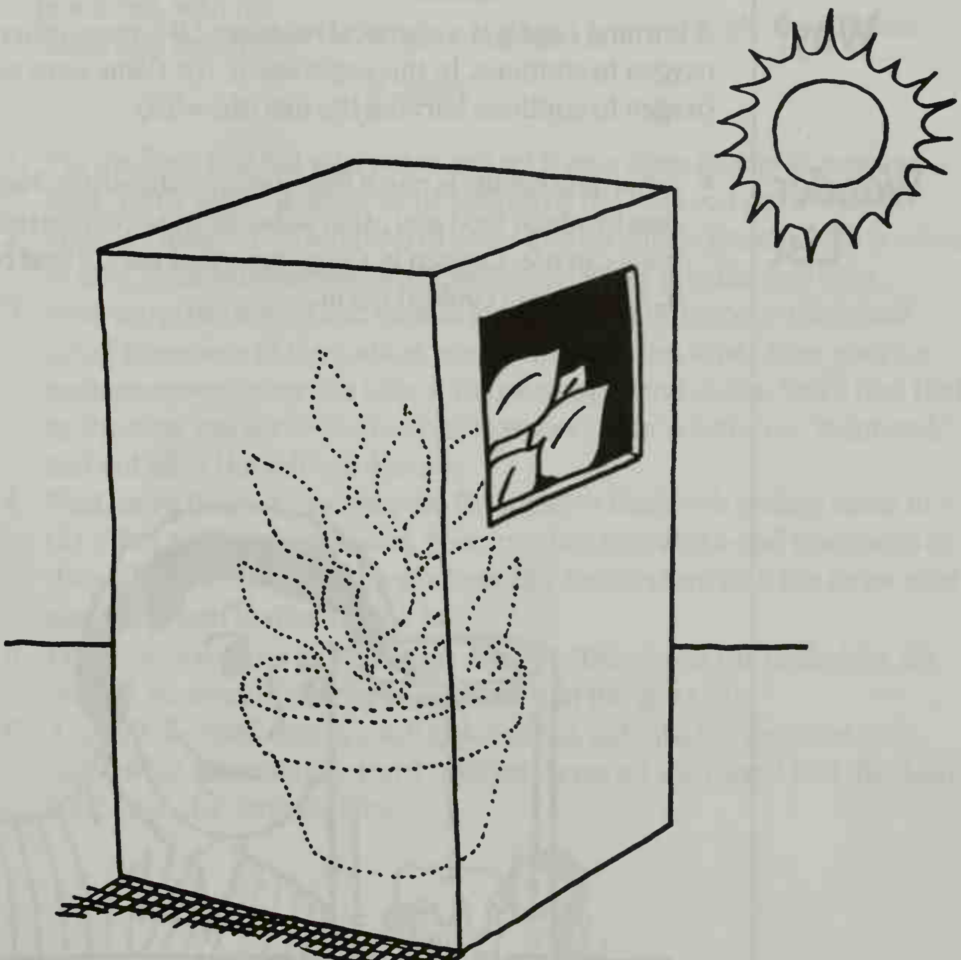
Why?

You can think of sunlight as the food of plants. Without sunlight, plants will neither grow nor live long. Through a process called photosynthesis, plants convert sunlight energy into a form they can use as food. In this sense, sunlight is not unlike the oxygen that we need to survive (see the Fuel for

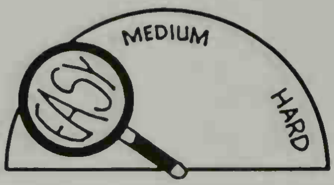
Thought experiment). When imprisoned in the darkness of a box, your plant was literally starved of nutrition. So, naturally, it had to adapt to its new environment. To drink up the only sunlight available, the plant turned its broad leaves toward the window. How long do you think your plant could survive with only this windowful of light?

Wonder List

- Why is it that the foliage of most trees is not at the base or even the middle of the tree, but at their very tip-tops?



48 Fuel for Thought



PARENTAL SUPERVISION RECOMMENDED
When you see a lighted candle, the wick is the fuel for the flame. Is that all the candle needs to burn?

What You'll Need

- candle
- matches
- a clear glass, tall enough to fit over candle

Directions

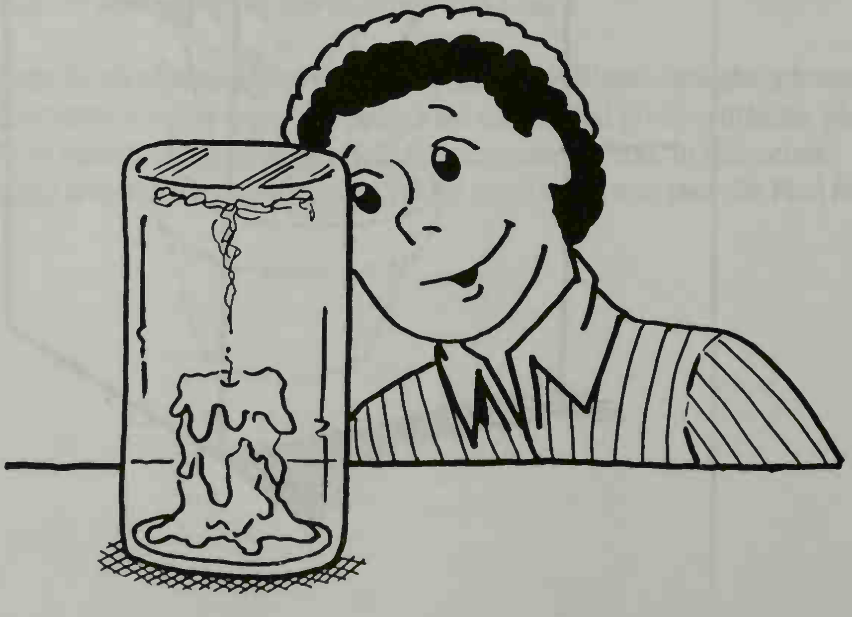
1. Light the candle.
2. Place the glass over the candle. Can you guess what will happen to the flame?

Why?

A burning candle is a chemical reaction. Like many other reactions, it needs oxygen to continue. In this experiment, the flame went out because it needed oxygen to continue burning the fuel (the wick).

Wonder List

- A burning candle is much like human metabolism. Metabolism is the process by which food and other substances are converted into energy that the body can use. Oxygen is a very important part of that process, and without it, metabolism couldn't occur.



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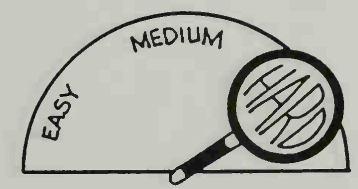
Mystical Crystals



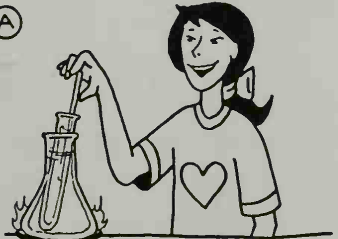
PARENTAL SUPERVISION REQUIRED
Have you ever seen a glistening geode with its lavender, green, or blue crystals sparkling in the light? Crystals are among the most beautiful of all structures. Their very precise shape comes from the precise way in which their atoms stack up like building blocks. Other substances such as glass have no such regularity, so they lack the special crystalline appearance.

What You'll Need

- 500-ml Erlenmeyer flask (with rubber stopper)
- sodium acetate, powdered, with no impurities (nontoxic)
- ice cubes
- funnel
- measuring spoons
- flashlight
- stove burner
- water
- 8″ test tube (with 8-cup volume)
- plastic straw
- tall glass
- glove potholder

Directions

1. Fill the flask half full with water and set it on a stove burner at medium heat. You'll want the water to be boiling by the time you get to step 4.
2. Make a "solution" (a mixture) of water and sodium acetate (which is a kind of salt). Pour two tablespoons of lukewarm water into the test tube.
3. Now, using the funnel and measuring spoon, bit by bit pour three-and-a-half teaspoons of the sodium acetate into the test tube. After pouring each teaspoon, cover the tube with the stopper and shake. You'll find that by the time you get to the last half teaspoon, your solution is "saturated," and not all of the salt will dissolve.
4. Next, drop the test tube into the Erlenmeyer flask with boiling water in it (A). After a couple of minutes, pour another four-and-a-half teaspoons of the sodium acetate into the solution. Stir the mixture with the straw after each teaspoon to dissolve the salt.
5. Place two ice cubes in a tall glass of water. Then, with the potholder, lift the test tube out of the flask and place it in the glass (B).
6. After 90 seconds, drop a small pinch of the salt into the test tube and watch what happens (C). Don't take your eyes off the tube. Hold the flashlight up to the crystals. Wow!



7. To repeat the experiment, just return the test tube to the flask, watch the crystals melt, then repeat steps 5 and 6.

Why?

Just as a building needs a first block to build on, a crystal needs its first block to build on. The building blocks for crystals are usually tiny particles. When you first poured the sodium acetate into the water, the water molecules grabbed on to the salt atoms, and the salt disappeared. But at a low temperature, the water can grab on to only so much salt. To get it to grab on to even more salt, you needed to increase the water temperature. So, as the water became hotter, it could pull even more salt atoms into the solution.

You then cooled the solution in the glass of cold water. All the salt that wouldn't dissolve at the lower temperature suddenly became available to make crystals. Here is where the building blocks came in: Before the salt atoms could make crystals, they needed something to grab on to (build on). Pinching in a bit of the salt provided the first block on which the salt crystal could grow. Once that happened, another crystal could build onto the first, and then another onto the second, and then in a matter of seconds, presto! Crystals . . .

Wonder List

- All of computer electronics is based on the controlled growth of crystals. Have you heard of silicon? It's a crystal!

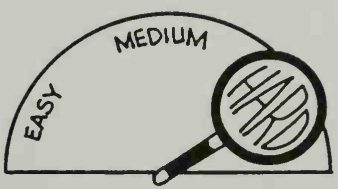
Ⓑ

Ⓒ

ADD PINCH OF SODIUM ACETATE AND WATCH!
SODIUM ACETATE

50

Cloud in a Jar



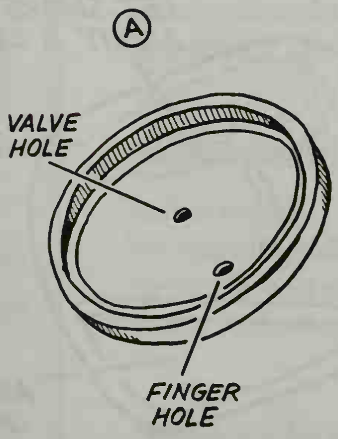
PARENTAL SUPERVISION RECOMMENDED
Clouds are amazing things. One minute the sky is clear, and the next minute an immense cloud is looming toward you. They can be wispy or billowy, dangerous or harmless. But how do clouds form? Let's make one and see.

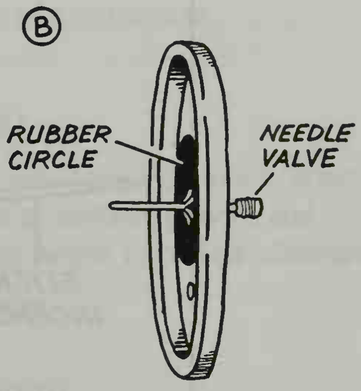
What You'll Need

- piece of rubber ⅓ ″ to ¼ ″ thick, cut in a circle to fit within the rubber ring inside pickle jar lid
- matches
- needle valve (for blowing up basketballs, etc.) and pump
- stick incense
- a glass pickle jar
- a partner
- hammer and nail

Directions

1. Nail two holes in the jar lid, one toward the outside of the lid (the "finger hole"), one in the center (the "valve hole") (A). Punch these holes from the inside out.
2. Push the nail through the center of the rubber to make a narrow hole.
3. Now put the needle valve first through the valve hole in the lid, then all the way through the rubber hole (B).
4. Attach the pump to the needle valve.
5. Put about one-half inch of water in the jar and swish it around.
6. With the jar held tilted at an angle, light the incense and stick it inside the jar for about three seconds (C). Then quickly pull it out and place the lid on the smoke-filled jar.





7. Have your partner hold the jar and cover the finger hole tightly. Then, pump air into it five times. The smoke will clear as you pump.
8. As you watch the jar very carefully, have your partner uncover the finger hole. Poof!

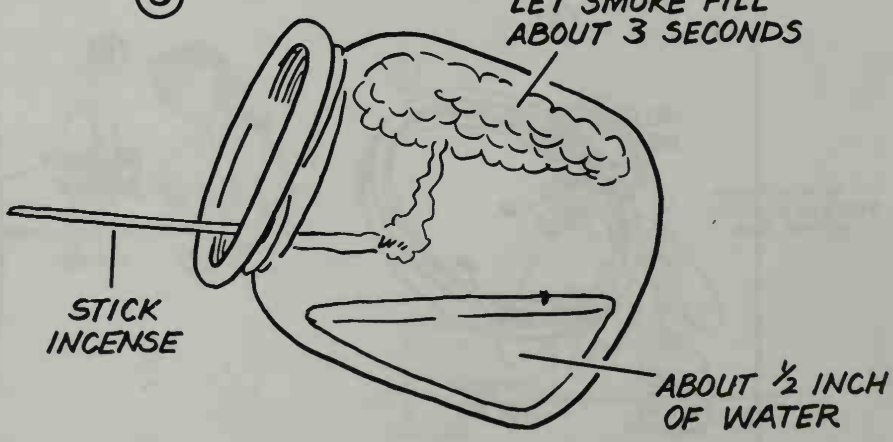
Why?

Clouds form when the air pressure and temperature in the atmosphere drop suddenly. This allows condensation, or the formation of water droplets from vapor, to occur. (You can see condensation form on a glass of cold water left standing in a warm room.) But just like crystals in the previous experiment, the water vapor in the air needs something to grab on to (usually dust or soot) before it can become a water droplet. The smoke particles in your experiment supplied the building blocks for the droplets. The water vapor in the jar wanted to condense into droplets, but it couldn't because the air pressure was too high. Releasing some of the air out of the jar (by uncovering the finger hole) caused a sudden drop in pressure and temperature and . . . pop! A cloud was born.

Wonder List

- In drought-stricken areas, farmers will sometimes purposely "seed" a cloud by dropping solid particles into it. The water vapor in the cloud will condense onto the particles and form water droplets—rain!
- Would you guess that among the most disastrous aftereffects of a volcanic eruption are mudflows? Why?

Ⓒ



Super Scientists

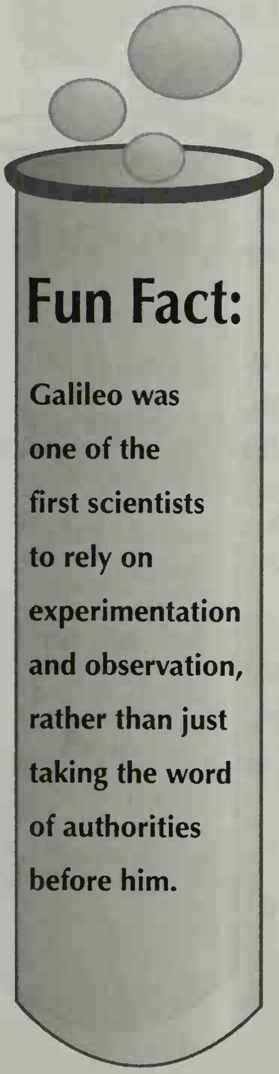
Here is a brief overview of some of the achievements and discoveries of the world's best-known scientists, listed chronologically.

Aristotle (384–322 B.C.)

Greek philosopher and scientist who invented methods of classifying animals by comparing their bodies and noting their similarities and differences.

Archimedes (287–212 B.C.)

Greek physicist, mathematician, and inventor who discovered how things float and how levers and pulleys work.



Fun Fact:

Galileo was one of the first scientists to rely on experimentation and observation, rather than just taking the word of authorities before him.

Leonardo da Vinci (1452–1519)

Italian artist, scientist, architect, and inventor who created designs for many machines, including flying machines.

Although many of Leonardo's inventions were made several years after he died, including a diver's suit and the helicopter, not a single invention was built during his lifetime.

Nicolaus Copernicus (1473–1543)

Polish astronomer who first realized that the earth, planets, and stars travel around the sun. Before his discovery, people thought the earth was the center of the universe.

Galileo Galilei (1564–1642)

Italian physicist and astronomer who founded modern science. He made important observations on motion, gravity, and forces. He also was one of the first people to build a telescope and to study the sky.

Johannes Kepler (1571–1630)

German astronomer who detected how planets move in the solar system. He developed three mathematical statements—

now called Kepler's laws—that accurately describe the movements of the planets around the sun.

Fun Fact:

Sir Isaac Newton was in his garden when an apple fell from the tree above him. This is what made him begin to ponder gravity!

Sir Isaac Newton (1642–1727)

English physicist and mathematician who created the theory of universal gravitation, which proves that gravity keeps planets and moons in orbit and keeps us from falling down!

He also discovered that white light is made up of all the colors of the spectrum. His theories are explored in the following experiments: Gravity as a Pump (page 14), The Un-Waterfall (page 23), Air Apparent II (page 28), Hot Socks (page 59), and Reflections on Color (page 32).

Louis Pasteur (1822–1895)

French chemist and biologist who made the life-saving discovery that bacteria (germs) cause disease. He developed pasteurization, a process that sterilizes a liquid, such as milk, keeping it from spoiling for a longer period of time. He also discovered a vaccine that prevents rabies in people.

Thomas Edison (1847–1931)

American inventor who used scientific principles to create many of his inventions.

He developed numerous items, including the first practical electric lamp and the electric distribution system, which led to the first central electric-light power plant. He also built the phonograph (the original record player) and a system for making movies.

Fun Fact:

Edison, who believed that his success was due primarily to hard work, said: "Genius is one percent inspiration and ninety-nine percent perspiration."

Edison inspired theories behind these experiments: The Human Antenna (page 55), Stop the Music (page 56), and The Light Barrier (page 60).

Marie Curie (1867–1934)

Polish-born chemist and physicist who, with her French husband Pierre Curie (1859–1906), studied radioactivity. Marie discovered two radioactive elements—radium and polonium. Together, the Curies won the Nobel Prize in physics in 1903, and Marie won the Nobel Prize in chemistry in 1911. The unit for measuring radioactivity, the curie, was named after her.

Albert Einstein (1879–1955)

German physicist who proposed the theory of relativity, which changed the science of physics. His famous equation $E = mc^2$ explains that a small amount of energy can make a huge amount of energy: The energy (E) of an object is equal to its mass (m) times the speed of light squared (c^2). This has led to several important discoveries: the speed of light, the sun's source of energy, the origin of nuclear power, and the existence of black holes in space.

Jane Goodall (b. 1934)

English scientist who studied chimpanzees at the Gombé Stream Reserve in Tanzania, Africa. She watched chimps for many years in order to determine how their family life is structured and has since devoted her life to protecting chimps. The institution she founded—the Jane Goodall Institute—is dedicated to preserving this endangered and very important animal species.

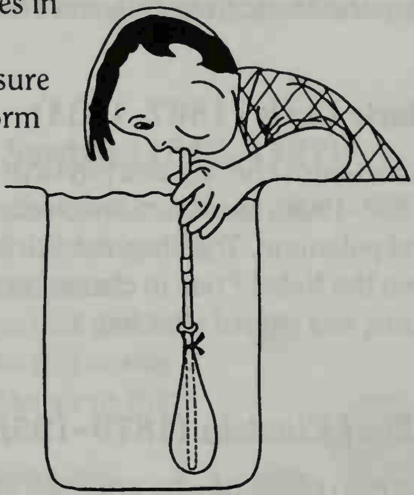
Stephen Hawking (b. 1942)

English physicist who has developed new theories about the beginning of the universe, the nature of matter, and black holes in space.

Glossary

air pressure—The weight of the atmosphere on a specific unit of area. Air pressure is important in weather. Small changes in air pressure happen all the time. Larger changes caused by movements of great low- and high-pressure areas can turn a sunny day to showers or a rainstorm to snow. For examples of air pressure, see:

Experiment #9, Give Me a Lift
Experiment #13, You Can't Blow It
Experiment #14, Boiling at Low Pressure
Experiment #15, Air Apparent I
Experiment #16, Air Apparent II



atmosphere—The mixture of gases that surround the earth or other planets. The earth's atmosphere is made up of nitrogen, oxygen, argon, carbon dioxide, and minute traces of several other gases. Beyond the earth's atmosphere is outer space. To learn more about the earth's atmosphere, see:

Experiment #23, Why Isn't the Sky Green?

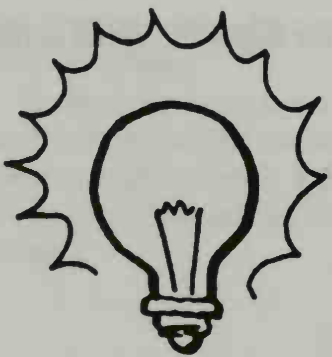
balance—The center of gravity, or the point around which every object's weight is centered. For an experiment dealing with balance, see:

Experiment #18, High-Wire Act

conduct—To transmit or carry a form of energy, such as heat, sound, light, or electricity.

conservation—The protection and care of natural resources, such as air, water, land, minerals, plants, and animals. Learn more about conservation by doing this project:

Experiment #45, Learning Topsoil Conservation



electricity—A form of energy that can be produced by chemical changes, magnetic forces, or friction. Charged electrical particles are either in motion or at rest. When particles are in motion, the energy is called an electrical current. When the particles are at rest, the energy is called static electricity.

Electricity can be changed into light, heat, motion, and other types of energy. For more on electricity, see:

Experiment #42, The Light Barrier

electromagnetic waves—A rhythm of magnetic and electrical energy that radiates in space, such as light, radio waves, X rays, and heat waves. See the following experiment for more information:

Experiment #39, Stop the Music

energy—The ability or capacity to do work or make things change. Energy comes in many forms, such as nuclear, mechanical, electrical, and chemical. Heat and light are major sources of energy. See mechanical energy at work in:

Experiment #8, Instant Hercules II

environment—Everything that surrounds you. The environment can include everything from houses and schools to air and water to plants and animals.

frequency—A measure of the number of complete cycles per second of any periodic wave of motion, such as sound. Try out this experiment to learn more about frequency:

Experiment #2, A Swing in Time

gravitation—A force marked by the movement of one object toward another. Every object that exists has a gravitational attraction to another object in the universe.

gravity—The force that pulls things toward the center of the earth or any planet or moon, caused by gravitation. Gravity causes people and things to have weight on earth, and it keeps us from floating out into space. These experiments will show you more about gravity and its effect:

Experiment #5, Gravity as a Pump

Experiment #11, The Un-Waterfall

interference—The interaction between and effect of waves coming together, such as light, sound, electromagnetic, or water waves. Discover more about interference with this experiment:

Experiment #27, It's the Wave!

light dispersion—The separation of light into different colors, such as when light passes through a prism. See it for yourself in this experiment:

Experiment #26, Light Dispersion

magnet—An object that creates a strong magnetic field and pulls things toward it that are made from iron, steel, nickel, and cobalt.

magnetic field—The area surrounding a magnet where its force works. For example, when a paper clip is within a magnet's magnetic field, it will be pulled toward the magnet. See these examples:

Experiment #37, Creating a Force Field

Experiment #40, The Invisible Made Visible

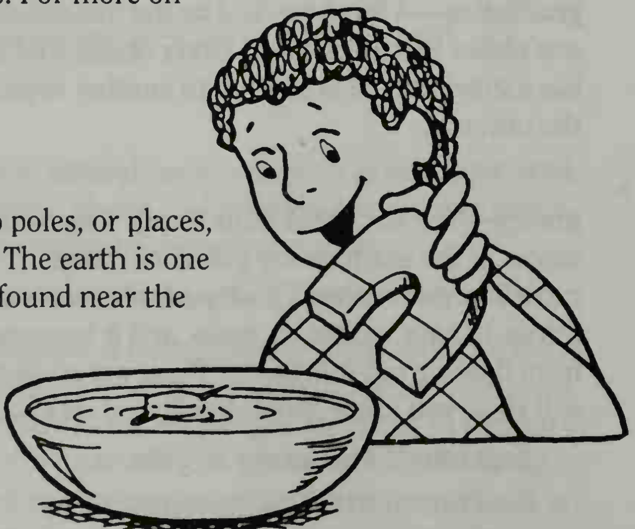
magnetic force—Microscopic particles that are charged, or filled with electrical energy, causing objects either to attract or repulse other objects. Magnetic forces are created by charges that are in motion. Electric forces are caused by static, or unmoving, charges. For more on magnetic forces, try these projects:

Experiment #35, Know Your Way

Experiment #36, Static Charge

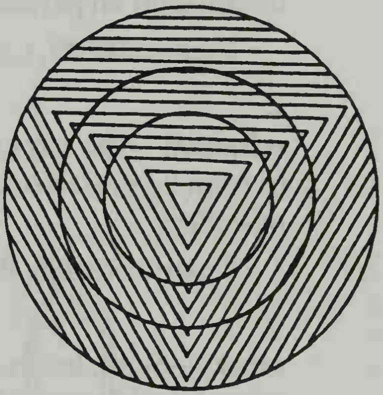
magnetic pole—Every magnet has two poles, or places, where magnetic force is concentrated. The earth is one giant magnet, with its magnetic poles found near the North Pole and the South Pole, the areas a compass needle will point to. Learn more about magnetic poles by trying this one:

Experiment #35, Know Your Way



metabolism—All of the chemical processes that keep an organism alive. Metabolism includes how the body breaks down food into energy and the way chemicals in the body are used for growth and repair. This experiment will teach you more about metabolism:

Experiment #48, Fuel for Thought



optical illusion—Something that looks different than it really is. Optical illusions could involve brightness, contrast, color, and figures. The following experiments are good examples:

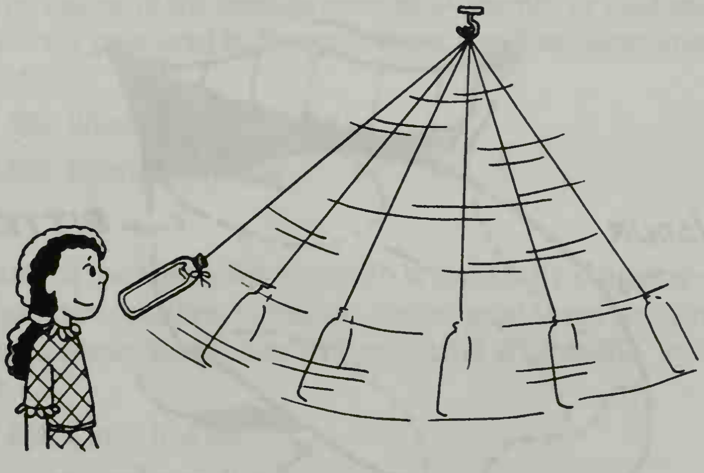
Experiment #24, Getting Nowhere

Experiment #28, Optical Illusions

pendulum—A weight hung by a chain or a rod from a fixed point that allows the weight to swing back and forth freely under the action of gravity. Check out these experiments for some hands-on pendulum experience:

Experiment #1, Let's Get into the Swing of Things

Experiment #2, A Swing in Time



photosynthesis—The process that plants use to convert sunlight energy into food. Plants have a green substance found in their cells called chlorophyll. Photosynthesis occurs when chlorophyll captures energy from sunlight, which then combines with carbon dioxide gas from the air and water from the soil. This makes nutrients that plants need to live and grow. To see photosynthesis in action, try this:

Experiment #47, Show Me the Light

physics—The field of science that deals with energy and matter and their interactions. Scientists who study physics, or physicists, investigate motion, heat, sound, magnetism, electricity, light, and other forms of energy. For more information on physics, see:

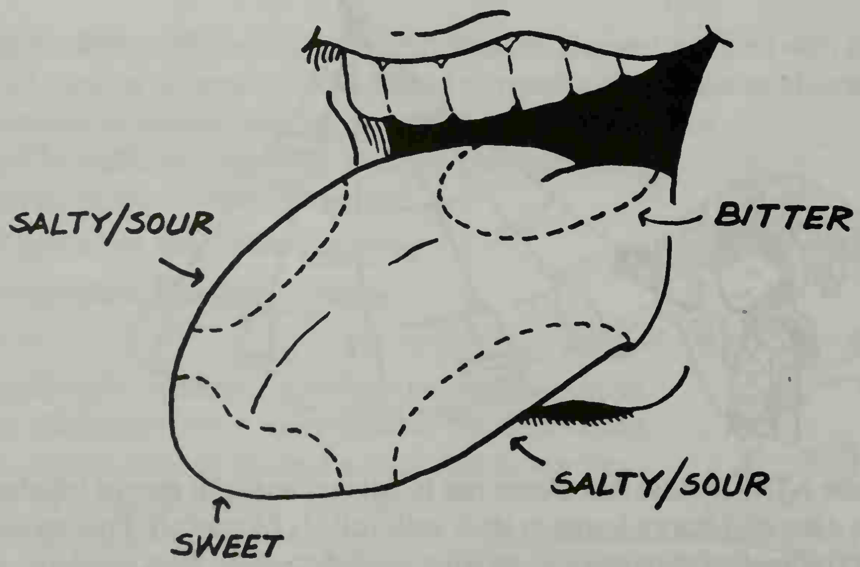
Experiment #9, Give Me a Lift

reflection—The way energy waves bounce back from a surface. The energy could be from light, electricity, heat, or sound. Try this experiment to learn more about reflection:

Experiment #20, Reflections on Color

senses—Sight, touch, taste, hearing, and smell are the principle senses for most animals and humans. These senses are the ways through which the brain receives and recognizes stimuli. Test your senses with these experiments:

Experiment #29, What's the Sense of It?
Experiment #30, Sweet-and-Sour Science
Experiment #31, Tickle Your Feet



sound—Sound travels in waves and is produced by vibrations that travel through a substance such as air or water. For more on how sound travels, see:

Experiment #44, Musical Bottles

temperature—The degree of the average amount of warmth or coldness of an object. Temperature is measured by thermometers. See these experiments for more on temperature:

Experiment #29, What's the Sense of It?

Experiment #49, Mystical Crystals

weather—The state of the atmosphere—which is constantly changing—in a specific location. It includes temperature, humidity, clouds, wind speed and direction, precipitation, and barometric pressure. Try your hand at "creating" weather with this experiment:

Experiment #50, Cloud in a Jar

physics—[illegible] interactions. [illegible] both matter [illegible] heat, sound, magnetism, electricity, light, and other forms of energy. For more [illegible] on physics, see:

Experiment #[illegible], One [illegible]

reflection—The way energy [illegible] from a surface. The energy could be from light, electricity, heat, or sound. Try this experiment to learn more about reflection:

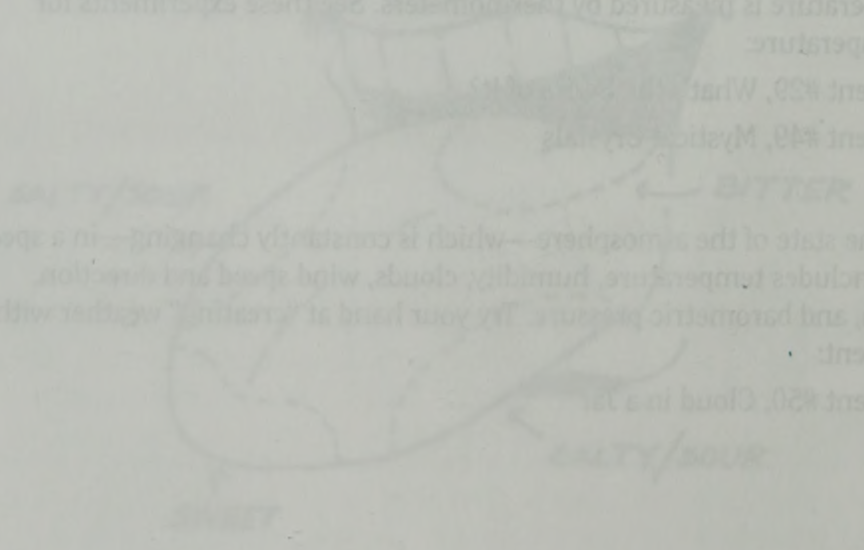
Experiment #[illegible], Reflection [illegible]

senses—Sight, touch, [illegible] are the principle senses for most animals [illegible] the ways through which the brain receives and [illegible] these experiments:

Experiment [illegible]

Experiment #[illegible], Sweet and Sour Science

Experiment #31, Taste Your [illegible]



After School Activities

NOTE: The numbered squiggle in the upper right-hand corner of each activity indicates the level of difficulty, with 1 as the easiest and 3 as the hardest.

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Schools Out!

Rrrrinngg! There goes the bell—school's out! Now what do you do?

After school is the perfect time to try new things. It's an opportunity to be creative and to explore different interests. Whether you are hanging out with friends or on your own, this section has tons of great activities to choose from—and plenty of things to keep you busy!

You can read this section from beginning to end, or simply flip through and choose an activity that appeals to you. At the back of this section you'll find a quick reference list to help you choose the perfect project for different situations. If you don't have many supplies around the house, take a look at "Make Your Own Materials." It is filled with ideas on how you can adapt these projects to use materials you already have.

If you get the munchies after school (and who doesn't?), try the easy-to-make recipes in this section. These simple snacks are especially cool because you can change them depending on the ingredients you have and the types of food you like.

Before You Begin

When you select an activity, keep these guidelines in mind:

- Parental supervision is recommended or required for a few of the activities. Make sure a parent or another adult is available to help if you choose to do one of those activities.
- The difficulty of each activity varies. Check the number marked in the upper right-hand corner for the level of difficulty.
- Think about the amount of time you will need to complete the project. Be sure to include plenty of time for cleanup!
- Find a good place to do each activity. If you think the project will be messy, try to do it outdoors or in a garage, or find someplace that is easy to clean up, such as a table or an uncarpeted floor. Put down newspaper or cardboard, and wear old clothes when necessary.
- Make sure that you have all the supplies you will need, or a reasonable substitute, before you begin. If you need to borrow any materials from a parent or a sibling, be sure to ask permission ahead of time.
- Read all the directions carefully before you begin to work on a project.

AFTER-SCHOOL TIP #1

Create a system to keep track of your homework assignments. This will help you juggle your time and remember exactly what you need to turn in to the teacher each day. With the system below, all you need is a blank piece of paper or a notebook. Make a grid like the one you see here, or develop your own system.

Date Assigned	Subject	Assignment	Date Due	Done

Smart Snacks

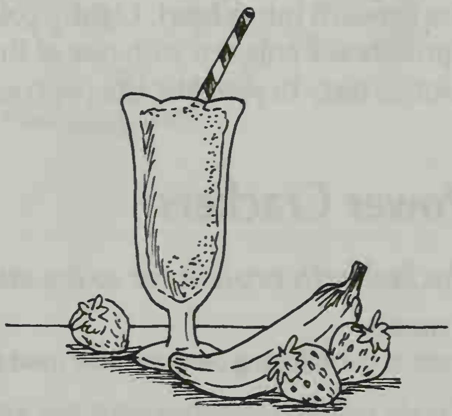
Eating a healthy snack when you get home from school will give you energy to enjoy the rest of the day. Snack time can be as simple or as creative as you want it to be. Try experimenting with a new recipe, or stick with an old favorite if you're in a rush. Here are a few simple snack ideas that you can make in a snap. (If you want to make a snack to share with a friend, just double the recipe.)

Fruit Smoothie

Perfect for a refreshing pick-me-up!

- lowfat vanilla yogurt
- ice
- orange juice
- any of the following: bananas, strawberries, watermelon, blueberries, oranges, peaches, pineapple, raspberries, or other fruit

In a blender, mix approximately 1 cup yogurt, 1 cup ice, and 1 cup orange juice with any fruit you like. Make flavorful smoothies by mixing different kinds of fruit each time.



Cheese Stix

A tasty twist on pretzel sticks

- nacho cheese sauce or Cheez Whiz®
- pretzel sticks

Pour some cheese sauce into a small bowl. Heat in a microwave, according to the directions on the jar or container of cheese. Dip pretzel sticks into the sauce and eat.

AFTER-SCHOOL TIP #2

If you can, do your chores as soon as you get home from school. Then you can enjoy whatever free time you have left! (And it will keep your parents happy.)

Popcorn with Pizzazz

Spice up an old standby!

- one bag of plain microwave popcorn
- nonstick vegetable spray
- one of the following: parmesan cheese, chili pepper, grated cheese, taco seasoning, ranch-style dressing mix

Follow the directions on the bag to prepare plain microwave popcorn, then pour the popcorn into a bowl. Lightly coat the popcorn with the nonstick vegetable spray. Sprinkle the popcorn with one of the seasonings listed above or anything else that sounds tasty to you. Mix the popcorn with your hands and eat.

Power Crackers

Packed with protein for extra energy

- crackers
- any of the following combinations: meat and cheese, peanut butter and jelly, cream cheese and olives

Create mini sandwiches with any kind of cracker you like. Try any of the exciting combinations listed above or create your own. Simply stack the ingredients between two crackers.

AFTER-SCHOOL TIP #3

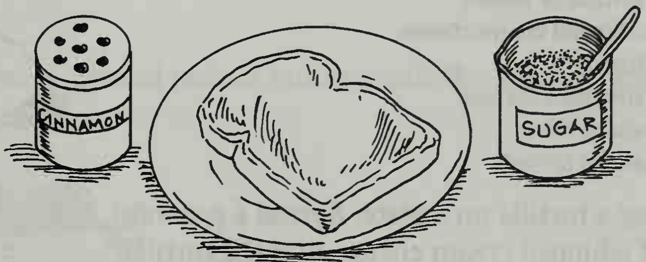
Set aside a regular study time. Whether you prefer to study in the afternoon or in the evening, a routine will make it easier to concentrate on the books. If you finish your homework right after school, you'll be able to enjoy the rest of the evening. However, if clubs or other activities keep you busy in the afternoon, doing your homework after dinner will be easier. Be sure to allow yourself enough time to finish before you get too tired.

Cinnamon Toast

A simply super sweet treat

- whole wheat bread
- butter
- cinnamon
- sugar

Toast a piece of bread. Spread a light coat of butter over the bread. In a small cup, mix 1 tablespoon sugar with ¼ teaspoon cinnamon. Sprinkle some of the cinnamon sugar mixture over the bread.



Fruit Bites

So yummy, you won't realize how healthy it is!

- any of the following: grapes, cherries, blueberries, melon, oranges, peaches, pineapple, raspberries, strawberries, or other fruit
- one dressing: strawberry or lemon yogurt; ½ cup plain yogurt mixed with peanut butter and honey to taste; applesauce with a trace of cinnamon

Wash the fruit and cut it into bite-sized pieces. Arrange the pieces on a plate. Mix one of the dressings listed above in a small bowl. Use a toothpick to spear pieces of fruit and dip them into the dressing. You can jazz up this recipe by freezing the fruit pieces first—it makes the perfect snack for a warm spring afternoon!

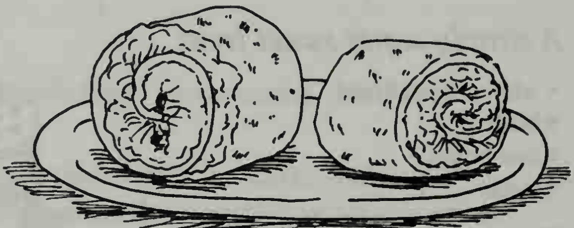
AFTER-SCHOOL TIP #4

Create your own study space. Choose a place to study that is quiet and well lit. Try to avoid distractions, such as a television. Use a desk or a table where you can spread out your books, and always sit on a comfortable chair.

Pinwheels

Wait till you wrap your fingers around this one!

- tortilla or lavash
- whipped cream cheese
- turkey
- shredded carrots
- sliced olives
- alfalfa sprouts



Lay a tortilla on a plate. Spread a spoonful of whipped cream cheese over the tortilla, then top with a slice of turkey, shredded carrots, sliced olives, and alfalfa sprouts. Roll the tortilla tightly, then cut into 2-inch-thick slices.

Juice Cups

A delicious homemade slushy

- any flavored juice

Pour some juice into a small paper cup, about two-thirds full. Carefully place the cup in the freezer. After half an hour, the juice should be slushy. After one to two hours, the juice should be frozen solid. You can push your slushy out of the cup or use a spoon to scoop it out.

AFTER-SCHOOL TIP #5

Have you ever heard of a "thinking cap"? Wear a baseball cap, a bandanna, or even a funny headband when you study to help you concentrate. There's nothing like a thinking cap to keep your mind on the books! If you wear your special hat every time you study, and only when you study, it will become an essential part of your study routine. It will also show others that you don't want to be disturbed unless it's important.

Ants on a Log

A creepy-crawly classic

- celery
- peanut butter
- raisins

Cut a celery stalk into 2-inch-long pieces. Spread peanut butter inside the celery, then top with raisins.

Banana Sandwich

An intriguing taste sensation

- two graham crackers
- one banana
- honey

Break each graham cracker in half, then arrange two pieces on a plate. Mash the banana in a small bowl, then mix in ¼ teaspoon honey. If you want to make it sweeter, add up to 1 teaspoon honey; if you don't want it to be sweet, skip the honey altogether. Spread the mixture over the graham cracker pieces on the plate. Place the remaining graham cracker pieces on top of each to make two sandwiches.

AFTER-SCHOOL TIP #6

Organize a study group. Since the key word is *study,* choose a friend or two who you know you will be able to study with. You'll probably feel more motivated to study when you are with someone else who is hard at work. Just encourage each other to get your homework done, so that you can have fun together later!

Cottage Cheese Delight

A cool surprise (and healthy, too)

- cottage cheese
- pineapple chunks
- maraschino cherry

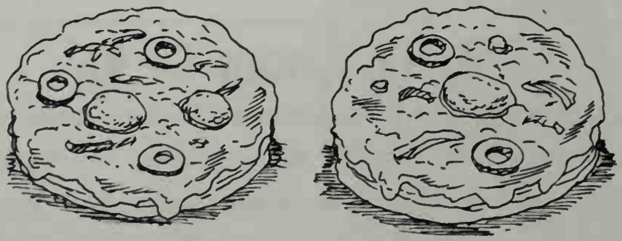
Spoon cottage cheese into a small bowl. Add pineapple chunks to the cottage cheese, and top with a maraschino cherry.

Mini Pizzas

A mini meal

- one English muffin, sliced in half
- pizza sauce or tomato sauce
- any shredded cheese: mozzarella, parmesan, cheddar
- pepperoni
- olives
- onions
- green peppers

Separate the English muffin into halves, and arrange them ragged-side up on a microwave-safe plate (or on tinfoil if you are using a toaster oven). Spoon a thin layer of pizza sauce or tomato sauce on each half. Sprinkle cheese on top. Add pepperoni, olives, onions, green peppers, or whatever you'd like. Heat in the microwave or a toaster oven until cheese is melted.



Crunchy Bits

Crunch, crunch, crunch—this one is a handful!

- banana or apple
- peanut butter
- granola or cornflakes

Cut a banana or apple into quarters, so that the pieces are manageable. Cover each piece of fruit with a thin layer of peanut butter. Spread granola or cornflakes on a plate. Roll fruit over granola or cornflakes until coated.

Veggies Galore

Finger food fun!

- packet of ranch-style dressing mix
- sour cream
- any of the following: cherry tomatoes, broccoli, cauliflower, radishes, celery, carrots, bell peppers, or other vegetables

In the container or a small bowl, mix the entire packet of ranch dressing with 2 cups sour cream. Wash the vegetables and cut into small pieces.
Dip veggies and eat.

AFTER-SCHOOL TIP #7

Make a set of flashcards to help you learn facts on almost any subject. All you need is a pack of index cards (or paper cut into 3 inches wide by 5 inches long rectangles). Write a math problem, science term, or vocabulary word on one side of a card, then write the answer or definition on the other side. You'll get some practice just by making the cards. You can test yourself by reading each card and answering aloud before you check the other side. Or you may want to have a friend or a family member quiz you.

Make Your Own Materials

Just because you don't have everything listed for one of the projects in this section doesn't mean you have to miss out! As long as you're creative and flexible, you can enjoy every activity. Simply adapt the project to work using what you have. You will probably discover ways to substitute materials on your own, but here are a few ideas to help you get started.

For many crafts, you can try these substitutions:

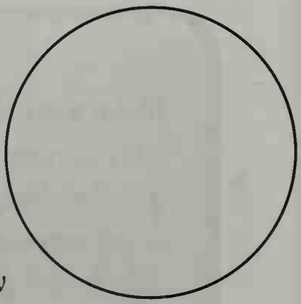
- use tape instead of glue, or vice versa
- use a cut-up brown paper bag, or poster board, instead of construction paper
- use a clock or a watch with a second hand instead of a kitchen timer
- use rectangles of paper, preferably white construction paper or poster board, instead of index cards

AFTER-SCHOOL TIP #8

As you try different projects, think about the ones that you enjoy the most. You may discover that you have a particular interest in science or in helping others. After school is a great time to try out a new hobby or practice a special talent.

GYOTAKU (page 100): If there's not a fish to be found, try this project with other materials that will make an interesting imprint, such as a leaf or tree bark. You could even try the bottom of an old tennis shoe.

INDOOR TABLE HOCKEY (page 107): If you don't have your own Pogs® for a start-up game of Indoor Table Hockey, you can make a set. Find a piece of thin cardboard that is at least 8 inches wide by 12 inches long, or use smaller pieces of cardboard. Trace the circle on this page onto a plain white piece of paper. Cut the circle out, then use it as a guide to trace 24 circles onto the cardboard. Carefully cut out the circles. If you want to, you can decorate your new game pieces with colorful markers.



ROBIN HOOD HAT (page 112): If you don't have green felt, try another type of stiff fabric, or even green construction paper, to make the hat.

FOOT VOLLEYBALL (page 113): If you don't have any stakes to attach the rope to, tie the rope between two trees or poles, about 10 inches above the ground. If you don't have a sheet to use as a net, spread pages of newspaper over the line, then staple the bottom edges together so that the newspaper won't blow off.

BELLS IN THE WIND (page 118): Use a coat hanger if you don't have an unsharpened pencil to hang the bells from.

FIVE-TOE PICKUP (page 119): Instead of pie tins, use paper plates as the goal markers.

A WHALE OF A SECRET! (page 127): Use an extra-large bowl, or even the sink, instead of a bucket to hold the water.

WINDSOCK WONDER (page 134): If you don't have an oatmeal container, take a large piece of lightweight cardboard (approximately 12 inches by 12 inches), bend it into a cylinder shape, then staple the edges together. Also, if you don't have seven pieces of fabric to hang on the bottom of the windsock, try using cellophane or ribbon.

STAINED "GLASS" MOBILE (page 138): If you don't have fishing line for the mobile, use thin string.

THE SUNNY DAY RAIN STICK (page 142): Try making this instrument with tiny pebbles, dried beans, or sunflower seeds in their shells if you don't have any split peas.

AFTER-SCHOOL TIP #9

Think of each activity as a stepping stone to many more fun projects. The possibilities are endless—you can research subjects that interest you, write stories, or try other forms of art. Here's one idea: After you make the Robin Hood Hat on page 112, look around your home and find other props you can use to complete the costume. Write a play about Robin Hood's adventures, and enlist a few friends to help you act it out. Send invitations to all of your friends and family, then perform your masterpiece. What other ideas can you come up with to create more fun?

Magazine Medley

There are approximately 6 billion people on Earth, but there's only one you! Show your true colors with this cool collage.

What You'll Need

- old magazines
- scissors
- pictures of yourself, your family, and your friends
- construction paper
- glue

Directions

1. Make sure it's all right with your parents for you to cut up old magazines. Then go through them and cut out pictures of activities you like and words or phrases that describe you. Also, ask permission to cut out and use pictures of yourself, your family, and your friends.
2. Arrange the cutouts on a large piece of construction paper, then glue them down. You can hang your collage in your room to remind yourself of what an awesome individual you are.

Further Fun

Make a collage for a friend, using words or phrases that describe him or her. It's a thoughtful gift that you will enjoy making.

Dinosaur Tag

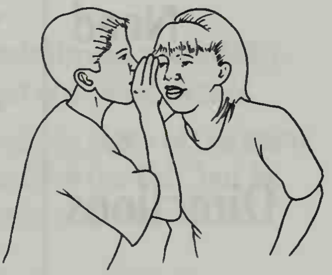
Tyrannosaurus, Brontosaurus, Stegosaurus, oh, my!

What You'll Need

- four or more players
- open, grassy area
- pencil
- paper
- five dinosaur names (such as Stegosaurus, Triceratops, Tyrannosaurus, Brontosaurus, and Seismosaurus)

Directions

1. Pick someone to be the King Dinosaur. The King Dinosaur picks one dinosaur name from the list of five, then writes it down on a piece of paper and puts the paper in his or her pocket.
2. The King Dinosaur closes his or her eyes and counts to ten, then is free to try to tag any of the other players. When the King Dinosaur tags another player, the tagged player must whisper one of the five dinosaur names into the King Dinosaur's ear. None of the other players should hear what is whispered.



3. If the name the player whispers *matches* the name that the King Dinosaur has picked, that player becomes a member of the King's court. Then he or she must help the King chase and tag the others.
4. If the name the player whispers *does not match* the name that the King Dinosaur has written on the paper, that player is set free. That player must guess a different dinosaur name from the list each time he or she is tagged by the King or a member of the King's court.
5. When a member of the King's court tags another player, the tagged person whispers a dinosaur name in the court member's ear. Again, if the dinosaur name matches the name that is in the King's pocket, then the person who is tagged must join the King's court. Continue tagging and "appointing" people to the court until all but one player are in the King's court.
6. The last free player becomes the new King Dinosaur. That person picks a new dinosaur name, writes it down, puts it in his or her pocket, and the game starts over.

3

Gyotaku

2

PARENTAL SUPERVISION RECOMMENDED

Asian fishermen *gyotaku* (fish printing) to prove the size of their catch to trade in the market. Now fish printing is used as decoration and for a somewhat slimy dose of good fun.

What You'll Need

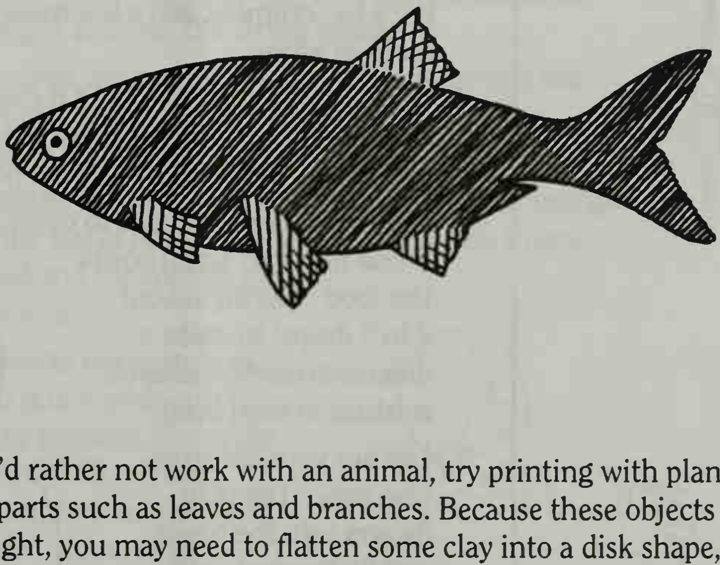
- old clothes or a smock
- newspaper
- whole, very fresh fish (flat fish with lots of scales, such as perch and flounder, work best)
- paper towel
- modeling clay
- medium-sized paintbrush
- water-based, nontoxic paints
- sketch paper
- tiny paintbrush

Directions

1. Put on some old clothes or a smock and cover your work space—both the table and floor—with newspaper.
2. Wash the fish thoroughly with water and a touch of soap to remove any slimy mucus. Be gentle so that you don't loosen the scales or damage the fins. Dry the fish with a paper towel and lay it on the newspaper that's covering your work table.
3. The fins will probably be folded down. Fan them open, then tuck the modeling clay underneath the fish's fins to keep them open.

4. Using the medium-sized paintbrush, coat the fish's body and fins (but not the eye!) with two thin layers of paint. Put on the first coat by moving your brush in long strokes from the fish's head to its tail. Put on the second coat by running the brush again in long strokes from the tail back to the head.
5. Place your sketch paper gently over the fish and press. Make sure to press the paper against all the different parts of the fish, especially the fins. Because the fish is round and the paper is flat, you may need to gently roll the paper around the fish in sections, so that the paper doesn't wrinkle.

6. Peel off the paper and take a look at your fish print. Note any changes you'll want to make on the next print. Set the print in a safe place to dry. Then repaint the fish to make another print (wash the fish again if you're going to use a new color). You can keep making prints as long as the fish's scales and fins hold together—usually about three to ten prints, depending on the individual fish.
7. When your prints are dry, use the tiny paintbrush and a different color paint to fill in the fish's eye. Add any other details.
8. Wash the fish very thoroughly until all visible signs of the paint are removed. If you wish, ask an adult to fillet the fish, but be sure to remove the skin, head, tail, and any other parts that came in contact with the paint. Enjoy!



Further Fun

If you'd rather not work with an animal, try printing with plants or plant parts such as leaves and branches. Because these objects are very light, you may need to flatten some clay into a disk shape, then press your object into the clay before you paint and print it.

4

Color Me Slimy

1

Cornstarch and water make a freaky substance that is totally *thixotropic*! (It acts like a solid and a liquid at the same time.)

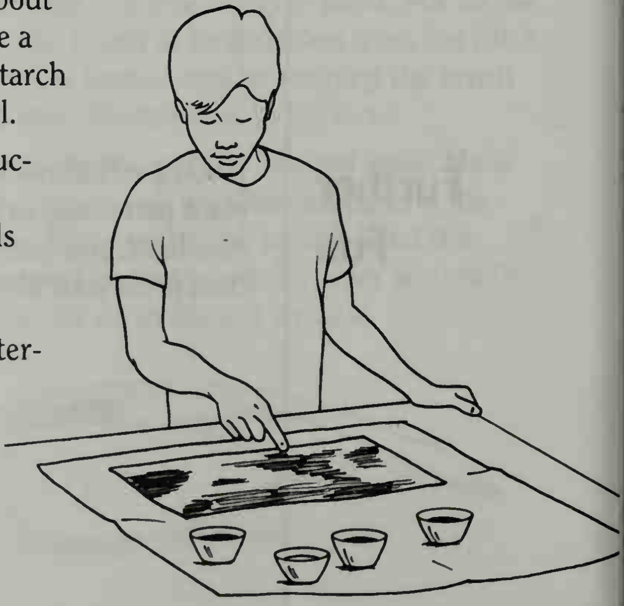
What You'll Need

- ½ cup cornstarch
- 6 tablespoons water
- large mixing bowl
- mixing spoon
- newspaper
- four small bowls
- food coloring (any four colors)
- white construction paper

Directions

1. Combine the cornstarch with 4 tablespoons water in the large mixing bowl and stir until well mixed. Pick up a glob and place it in the palm of your hand. It should slowly flow into a pool of liquid. Now make a fist around it and squeeze it into a ball shape. It should hold the shape for a few seconds, then "melt" into a liquid again. If it's too crumbly, add a few more drops of water.

2. When you're done watching it change forms, put the cornstarch ball back into the mixing bowl and mix in 2 tablespoons water. It should act like a liquid now.
3. Lay down the newspaper to cover your work area. Divide the liquid into four small bowls. Use food coloring (about 2 to 3 drops) to make a different color cornstarch mixture in each bowl.
4. Lay out your construction paper. Dip your fingers into the bowls and fingerpaint with the cornstarch mixtures to make a masterpiece of color and imagination.



5

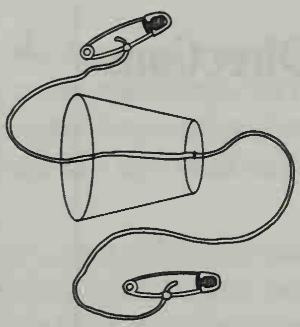
Chicken Noisemaker

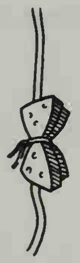
There's a chicken loose in the house! Or is it just an *audio* illusion?

What You'll Need

- ballpoint pen
- plastic cup
- 14-inch piece of cotton string
- two safety pins
- piece of kitchen sponge, 1 inch wide by 2 inches long
- 12-inch piece of dental floss

Directions





1. Use the writing end of the pen to poke a hole in the very center of the bottom of the cup. The hole should be just big enough to allow the string to pass through it.
2. Thread half the length of the string through the cup. Tie a safety pin to each end of the string. The safety pins will keep the string from being pulled all the way through the hole. Hold the cup upright and pull the string down.
3. Dampen the sponge piece and fold it around the string. Use the dental floss to tie the sponge tightly around the string.
4. Moisten the string under a faucet. Slide the sponge to the top of the string. Now hold the cup in one hand and the sponge in the other.
5. Squeeze the sponge as you pull it with quick, jerky motions, down the length of the string. Listen to your chicken cluck, cluck, cluck.

6

School-Year Remembrance Album

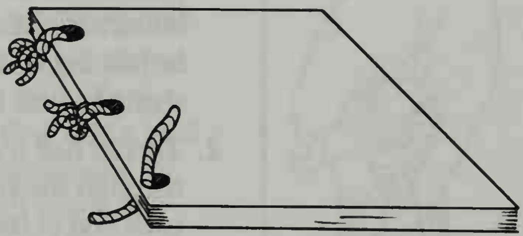
2

Preserve your memories of friends and fun in this keepsake you'll treasure for years.

What You'll Need

- scissors
- construction paper
- hole punch
- three 10-inch pieces of yarn
- pen or colored markers
- glue
- school pictures of yourself and friends

Directions

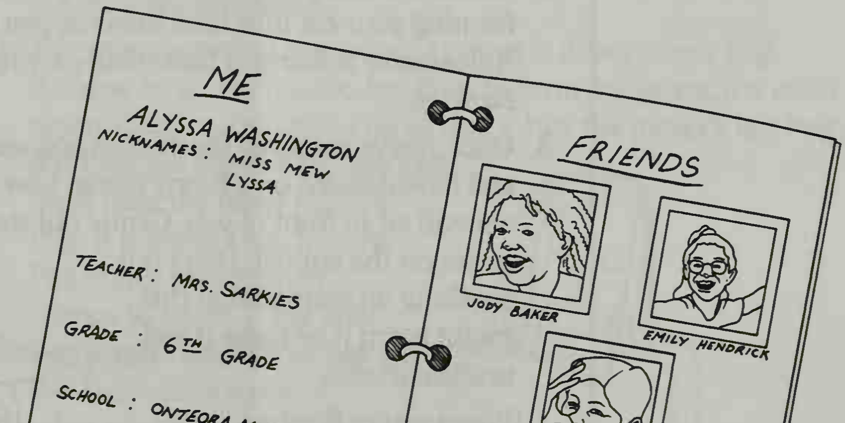


1. To create this special album, start by cutting out ten pieces of construction paper, each 7 inches wide by 10 inches tall. Using the hole punch, punch three holes along the left side of all the pieces of the construction paper (make sure all the holes line up). Thread a piece of yarn through each hole and gently tie it off. Don't tie it too tight or the pages of your album won't turn.
2. Start the album by introducing yourself. Write "Me" at the top of the page, then fill in the rest of the page with your name, any nicknames your friends call you, your teacher's name, your grade, and the name of your school. Glue a picture of yourself on the page.
3. Write the word "Friends" on the top of the next page. Glue school pictures of your friends onto the page, and write each friend's name under his or her photo. Also write in the names of friends whose pictures you don't have. The "Friends" section may take up more than one page.
4. Write "What's Hot?" on the next page. Fill in the name of your favorite band, your favorite movie from this year, and any fads that are currently taking over your school.
5. Write "Cool Stuff I Do" on the next page. List all the things you do at recess or after school. List your favorite sports and activities. Glue in either a photo or drawing of yourself playing a sport or enjoying a hobby.

6. Fill the other pages with items to help you remember the school year. You can glue in movie ticket stubs or report cards. Write about things that have happened to you or about activities with which you are involved. What are the best and the worst things that happened to you so far this year? If you're still at the beginning of the school year, keep five or six pages blank so you can add things as the year goes by.
7. You don't have to finish the album in one day. Once a week, you could take a few minutes after school to add new things. By the end of the school year, you'll have lots of good memories about the year's activities. Then put your album in a safe place so it will keep forever!

Further Fun

A school-year remembrance album makes a great gift for a friend or classmate. Be sure to list his or her teacher, other friends, pets, the activities he or she enjoys, what you like most about him or her—anything that will make it special for him or her. Also include blank pages that he or she can fill in.



7

Fashionable Fido

2

It's time for the aCATemy awards! Spend an afternoon with your favorite cat or dog (or stuffed animal) to create a furry version of your favorite movie star, rock star, or fictional movie character.

What You'll Need

- old clothes and accessories (with a parent's permission)
- cooperative dog or cat, or a stuffed animal
- instant camera with film (optional)

Directions

1. Before you begin your clothes hunt, think of the character that you'd like your animal to imitate. You'll probably need to find a hat, shoes, socks, a shirt or sweater or short dress, sunglasses, a wig—anything you can find that will help you transform your four-legged friend into a celebrity. Find clothes that will help you create the right image. For example, a Western look would include a cowboy hat, boots, and bandanna. A glamorous look could include a feathered boa, a big wig, and sunglasses.
2. Think of a funny name for your new celebrity. If you're transforming your cat into Julia Roberts, you can name it Julieeeeeow Roberts. A basketball-playing dog could be Charles *Bark*ley.
3. Once you've gathered the clothes and accessories you'll need, and have decided on a funny name, have your pet (or stuffed animal) sit in front of you. Gently put the clothes and accessories on the animal. Don't put anything on your animal that might harm it or make it feel uncomfortable.
4. When you're finished, invite friends or family members over to introduce them to your new celebrity. If you have a camera, have the big star's "fans" pose with it for a picture!

8

Indoor Table Hockey

1

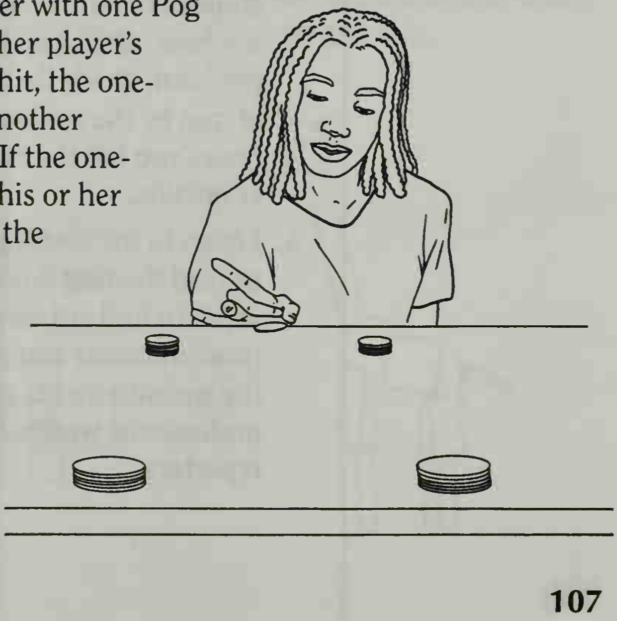
This game puts a new spin on Pogs®.

What You'll Need

- two players
- flat, smooth table
- twenty-four Pogs

Directions

1. The object of this game is to be the first player to get rid of all your Pogs. Players should face each other on opposite ends of the table. Each player starts with twelve Pogs and should divide them into two stacks of six each. The stacks should be placed approximately 6 inches apart. These are the goalposts for your game of hockey.
2. To play, the first player takes a Pog from one of his or her columns. The player places the Pog flat on the table, then shoots the Pog from behind his or her goalposts using a quick flick of the fingers. The Pog should skim across the table. If the player flicks his Pog *between* the other player's goalposts, the other player must put the Pog on one of his or her stacks. If the first player doesn't make it through the other player's goalposts, then he or she must keep the Pog. Players take turns whether or not the goal was successful.
3. The game is almost over when a player is down to one Pog. Because he or she has too few Pogs to form goalposts, the other player must try to flick a Pog so that it hits the player's last Pog. If it hits, the player with one Pog must keep the other player's Pog. If it doesn't hit, the one-Pog player gets another chance to shoot. If the one-Pog player flicks his or her last Pog between the other player's goalposts, he or she wins the game.



9

Rain Reader

2

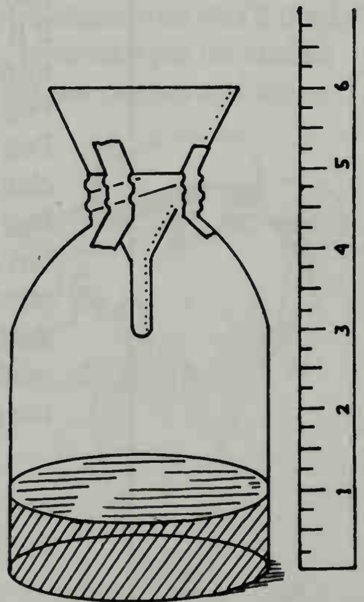
It's raining, it's pouring. How much rain is falling? Your rain reader will tell you. And if it's not raining, you can still create your rain gauge to be prepared to catch every raindrop when the next storm comes!

What You'll Need

- large, empty glass jar (mayonnaise jars work well)
- funnel that fits the mouth of the glass jar
- masking tape
- kitchen timer with buzzer
- ruler

Directions

1. Clean out the glass jar and remove any labels still stuck to it. Place the funnel snugly in the mouth of the jar and tape it in place (see illustration).
2. If it's already raining outside, you're in luck. Set the kitchen timer for two hours. Then go outside and set the rain reader down in an open flat area, where trees or roofs won't interfere with the falling rain. Come back inside and get dry!
3. When the kitchen buzzer goes off, retrieve your rain reader. Put it on a table and hold the ruler up to the jar so you can measure how much rain has fallen. Divide that number by two and you'll know how much rain has fallen per hour over the last two hours. If it's only raining lightly, you'll want to leave it out for a few more hours—long enough for a measurable amount of rain to fall. To find out how much rain has fallen per hour, divide the amount of rain by the number of hours you left the rain reader outside.
4. Listen to the evening news or read the next day's paper to find out how your measurements compare to the measurements given by professional weather reporters.



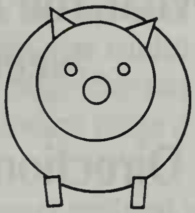
10 Colorful Creature Creations

1

Snip, clip, shuffle, pick! It's a race against the clock—and each other—to see who has the quickest eyes and fastest hands.

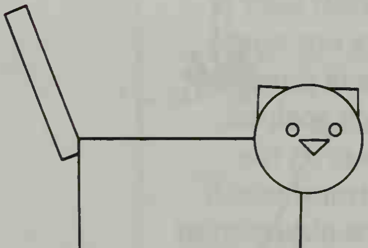
What You'll Need

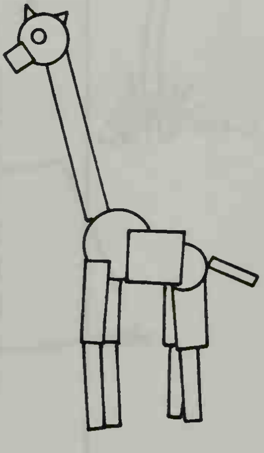
- three or more players
- several sheets of construction paper in different colors
- scissors
- clock or watch with second hand



Directions

1. Have each player cut ten squares, ten circles, ten triangles, and ten rectangles of different colors and sizes from the construction paper. Have all the players sit in a circle and put all the cut-out shapes into a pile in the center of the circle. Mix them up.
2. Assign one player to be the timer. The remaining players are shape-makers. The timer chooses a type of animal and tells the shape-makers to make that animal out of the pieces of construction paper. Then the timer tells the shape-makers to "Go!" and begins timing on the clock or watch.
3. After sixty seconds, the timer says "Stop!" The timer looks at the animals created by each shape-maker, then decides whose animal has the best likeness to the animal he or she named.
4. The person who made the best animal is the winner and becomes the timer for the next round.
5. To make the game easier or harder, adjust the amount of time that the shape-makers have to make their animals.





11

Flying Disk Croquet

2

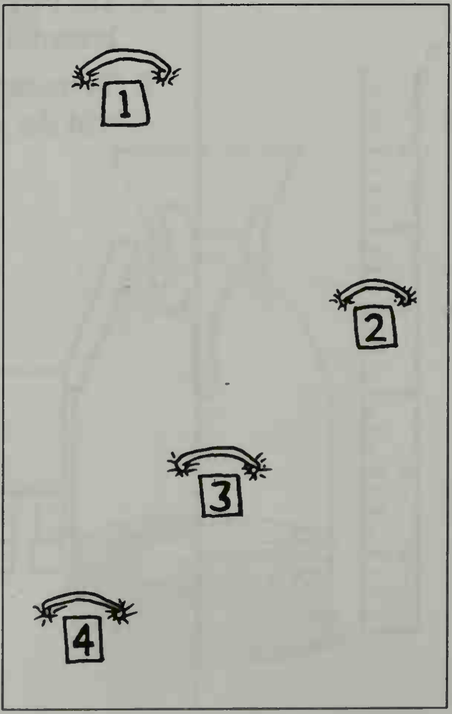
A bit of practice and a quick flick of the wrist is the secret to being a champion at this game.

What You'll Need

- two or more players
- four old wire hangers
- open grassy area
- pen
- four pieces of paper
- flat plastic can lid (such as a coffee can lid) for each player

Directions

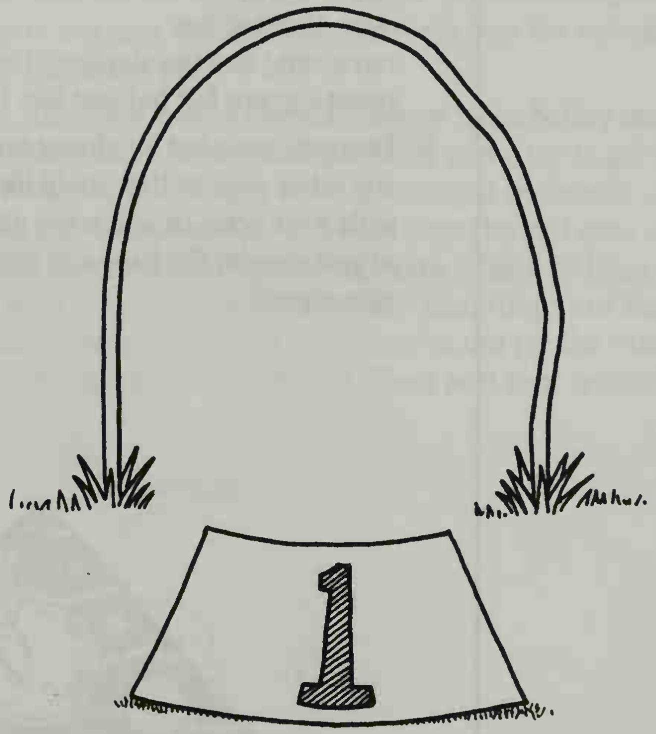
1. Take apart the hangers by untwisting the wrapped wire at the neck of the hanger. Bend each hanger into a *U* shape (wires are hard to bend—don't worry if your shapes are a bit crooked). Ends should be about 12 inches apart. Take the hangers outside to a grassy area where you can set up and play the game. The hangers will be the goalposts.
2. Decide where you want the goalposts to be. A simple course could be set up like a baseball diamond, with one goalpost in each of four corners. Another sample pattern might be like the one shown here (see illustration).
3. To set up a goalpost, grab a wire hanger by both ends and push the ends deep into the grass. Make sure the ends are pushed in deep enough so they won't come out easily, but not so deep that there's no room for a disk to fly through the goalpost. Add more goalposts or put the goalposts farther apart to make the course more challenging.
4. Write one number, from 1 to 4, on each piece of paper. Place one numbered piece of paper in front of each goalpost. The numbers on the paper determine which goalpost the players must get through first, second, and so on. Now the course is ready for play.



5. Each player lines up about 8 feet behind the first goalpost. The first player tries to get his or her disk through the first goalpost by tossing it. If he or she misses, the next player's turn begins. When a player successfully tosses his or her disk through the first goalpost, he or she goes to the spot where the disk landed, stands on that spot, and tries to toss the disk through the next goalpost. The player's turn ends when the disk doesn't make it through the goalpost.
6. The first player to toss his or her disk through every goalpost is the winner.

Further Fun

Have a neighborhood disk croquet challenge. Set up the game to run from one house to another, in yards where you have permission to put the goalposts. You'll probably need to make at least six additional posts.



12 Robin Hood Hat

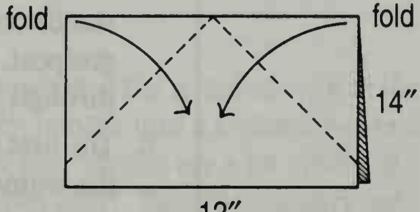
1

Hi ho! This merry hat will get you in the spirit for adventure!

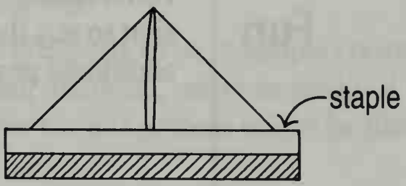
What You'll Need

- piece of green felt, 12 inches wide by 14 inches long
- stapler
- ribbons, feathers, buttons, colored felt-tipped pens, and/or glitter
- glue

Directions



1. Place the piece of felt flat in front of you. Fold the felt in half so the top edge meets the bottom edge. Fold the upper right- and left-hand corners in toward the center (see illustration).



2. Fold the bottom flap up as shown, and staple it in place. Turn the hat over, and fold the remaining flap up, stapling it in place as well. Voilà! You've made a green felt hat just like Robin Hood used to wear.
3. Decorate your hat by gluing on ribbons, feathers, buttons, or any other objects that you'd like to use. Draw colorful designs with your pens, or add some glitter. Wear your wonderful hat as you wander the house in search of further after-school adventures.

13

Foot Volleyball

1

You'll get a real kick out of this game, which is a variation of a sport played in Thailand. The object is to pass a ball back and forth over a net using only your knees or feet—no hands allowed!

What You'll Need

- two or more players
- soft, grassy area
- rubber mallet
- two 12-inch or longer sturdy wooden stakes
- 10-foot length of rope
- old twin-sized sheet (get permission from an adult before you use it!)
- volleyball or soccer ball

Directions

1. Find a soft, grassy area. Use the rubber mallet to hammer the stakes into the ground. The stakes should be placed about 7 feet apart. Tie one end of the rope around one stake, then run the rest of the rope over to the other stake and tie the end so the rope stretches tightly between the stakes. Drape the sheet lengthwise over the rope. This will be your net.
2. Now you're ready to play! Divide the players into equal numbers (or as close to equal numbers as possible) on both sides of the net, then toss the ball in the air to begin. See how many times the players can pass the ball back and forth over the net using only their knees or feet.
3. To start, allow the ball to bounce once or twice before sending it back over the net. When you get really good, try to get it back and forth over the net without letting it bounce at all. Have the players count out loud each time the ball goes over the net. If someone touches the ball with a hand or head, or if it rolls away from the playing area, the counting must begin all over again. The goal is to set your own record for the number of times the ball goes over the net. Then beat *that* record!

14

Pine Needle Space Boots

3

PARENTAL SUPERVISION RECOMMENDED

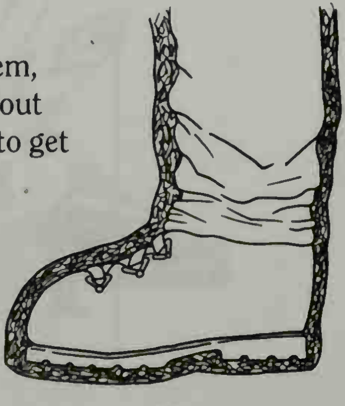
Astronauts wear thick, padded boots attached to their space suits when they bounce along the moon's surface. You can make your own pair of space boots without even leaving Earth!

What You'll Need

- scissors
- old pants and shoes (hiking boots work best)
- four shoe boxes full of brown pine needles (brown, fallen leaves or palm fronds work well, too)
- pair of old panty hose
- roll of silver duct tape

Directions

1. Use the scissors to cut the legs off the panty hose, making the cut at knee level. Save the two leggings and throw the rest away. Put on old pants and shoes, then go outside to make your boots.
2. Put on one of the panty hose leggings over your right shoe, and pull it up over your jeans until it reaches your knee. Take your pine needles (or other dry plant material) and shove them down to the bottom of the panty hose. Pack the pine needles all around your shoe (even under your shoe). Keep packing the plant material into the panty hose until you have a 1-inch-thick layer of padding all around your leg.
3. Now follow the same procedure for your other leg.
4. Finally, one leg at a time, wrap a layer of duct tape all around the packed panty hose. Once your boots are well sealed, try stomping through mud or walking through puddles. If you've done a good job of packing the needles and wrapping the tape, they should be warm and waterproof!
5. When you're ready to take off your boots, you can try to slip out of them, but you may need to cut your way out with the scissors. If so, make sure to get help from an adult.



15

Ancient Treasure Map

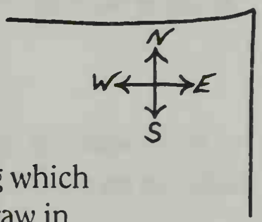
What will you find buried in the place where *X* marks the spot? That is for you to decide when you create your own unique treasure map.

What You'll Need

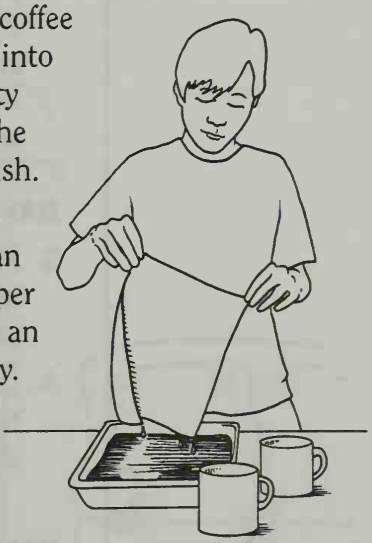
- permanent marking pens
- plain white paper
- 2 cups of strong coffee, cooled
- glass baking dish, 13 by 9 by 2 inches
- four paper towels, stacked
- 12-inch piece of ribbon, any color

Directions

1. In the morning, ask an adult to save some coffee. You'll need at least a cup or two for this project.
2. Since most treasures are buried on islands, start your map by using permanent markers to draw an outline of an island on the paper.



3. Put a compass mark in one corner (showing which direction is north, south, east, and west). Draw in landmarks such as trees and cliffs. Add names of roads and mountains. Then mark a large *X* where the "treasure" is buried.
4. To make the map look ancient, you'll need to "age" the paper. Pour the cooled coffee into the baking dish. Put your map into the coffee bath and let it sit for thirty minutes. Remove the map and let the excess coffee drip into the baking dish. Lay the map on the paper towels.
5. When your map is wet, the paper can tear easily. Gently pull off bits of paper from the edges of the map to give it an uneven border. Then let the map dry. Once it's dry, carefully roll it up and tie the ribbon around it, then deliver it to a friend or family member with whom you want to share the secret of your treasure!



Further Fun

Hide some real treasures, such as candy or a few coins, in your home or neighborhood. Then make a map showing where the treasure lies. Give the map to a friend to see if he or she can find the goodies.

16

The Amazing Art Exhibit

3

It's time for you and your friends to show off all the great artwork you've created over the years. Allow yourself at least one week to complete this project.

What You'll Need

- one or more friends
- six or more pieces of artwork from each artist
- colored felt-tip pens
- 3-by-5-inch index cards
- construction paper

Directions

DAY 1 *(at least one week before the show)*

1. Get a parent's permission to set up a temporary art show in a room of your home one day after school. (You'll also need to okay the exact date and time with them when you've decided upon it.)
2. Ask your friends if they'd like to help you put on an art exhibit. If they're interested, have each person bring his or her favorite pieces of artwork over to your house. You should have at least six pieces per artist—and more if there are only going to be two artists displaying their work. Artwork can include favorite paintings, clay statues, papier-mâché marvels . . . anything! If you don't have enough pieces, you can create some new art especially for the show. Once you have enough artwork collected, set a date for the exhibit. Store the art pieces somewhere out of reach of pets and younger siblings.

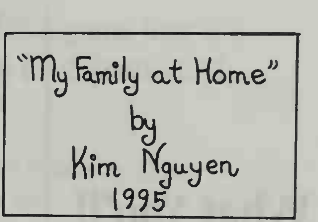
DAY 2 *(six days before the show)*

3. Make up a guest list of people you would like to invite, including parents, grandparents, brothers and sisters, friends, and neighbors.
4. Use colored pens and construction paper to make up invitations, which should tell what the event is, when it is, and where it is. Mail or hand deliver the invitations.

DAY 3 *(the day before the show)*

5. Take the pieces of art out of storage and arrange them around the room so guests who come for the viewing can see each piece well. They can be laid out on tables, set up on bookshelves, displayed on benches or chairs, or hung from the wall (if you have permission to use tape or tacks to put them up).

6. Your guests will want to know who made each piece, what the title of the piece is (if it has one), and the year it was created. Use 3-by-5-inch cards and the colored pens to make a label for each piece, then arrange the labels next to each piece of artwork.

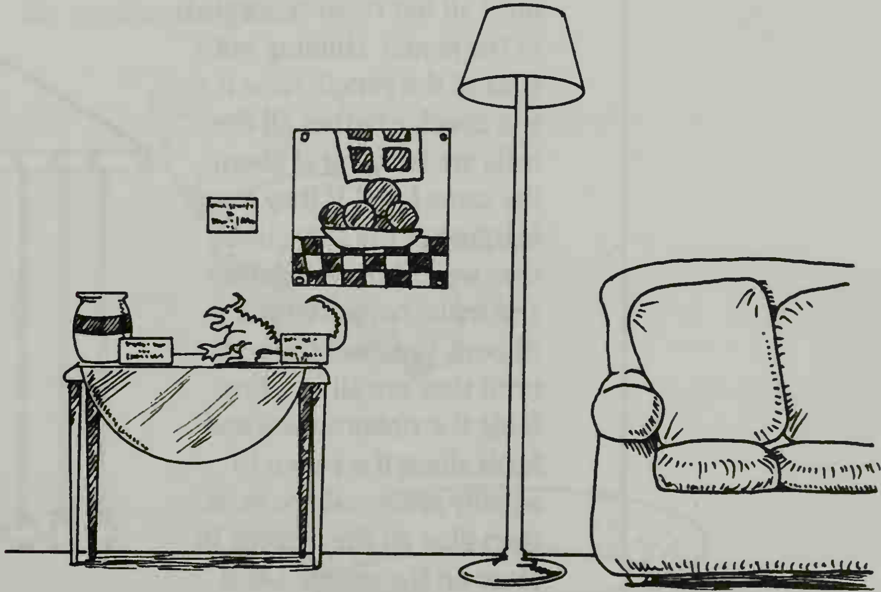


"My Family at Home"
by
Kim Nguyen
1995

7. Check the lighting in the room where you are going to have the show. If any of the art is placed in a dark area, set up a lamp or flashlight to shine on that piece, so guests will be sure to see it.

DAY 4 *(exhibit day!)*

8. Before the guests arrive, double check that all the artwork is in its proper place and labeled. Turn on any special lamps or lights. Then wait for the doorbell to ring.
9. Make sure all the artists are on hand to answer questions about their pieces. Help guide guests around the room so they're sure to see everything. Take a deep breath, and enjoy your time in the spotlight!



17

Bells in the Wind

2

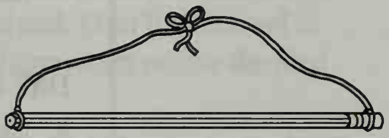
These beautiful ribboned bells are perfect for hanging outside a bedroom window or giving to a friend as an enchanting musical gift.

What You'll Need

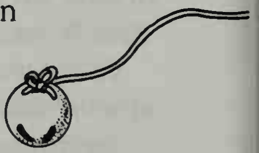
- twelve 10-inch strands of colored ribbon, ⅛-inch wide or less (available at fabric stores)
- new unsharpened pencil
- white glue
- ten small jingle bells, about the size of cherries (available at art supply or craft stores)

Directions

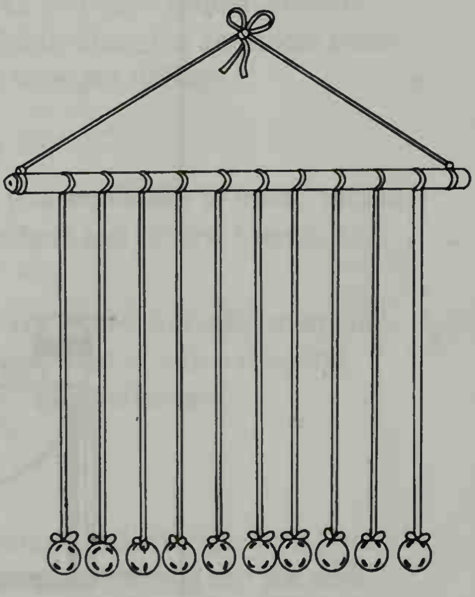
1. Tie a piece of ribbon to each end of the pencil, then tie the two ribbons together (see illustration). To secure, glue the ribbons in place on the pencil. Put aside.



2. While the glue is drying, take a new piece of ribbon and thread it through a bell. Tie it so that the bell hangs down from the end of the ribbon. Repeat for the remaining bells and ribbons.



3. Tie the free end of each ribbon around the pencil until all ten ribbons are tied to the pencil. Holding both ends of the pencil, raise it up and check whether all the bells are hanging at about the same level. If they aren't hanging at the same level, they won't knock together and make noise. Retie any ribbons to adjust the bells until they are all in a line. Slide the ribbons back and forth along the pencil to equally space out the bells, then glue all the ribbons in place on the pencil. Let it dry for thirty minutes.



4. Take your wind chime outside, hang it from a hook or tree branch, and enjoy the music!

18 Five-Toe Pickup

1

Are you good with your toes? Find out with this game that will challenge your podalic dexterity. (That's foot coordination, of course!)

What You'll Need

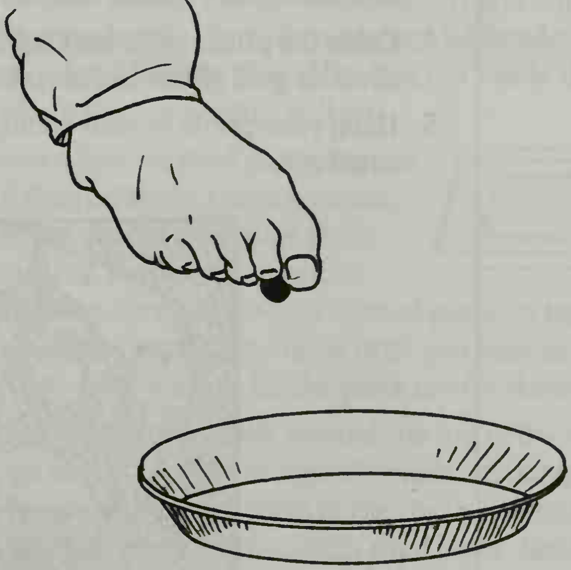
- two players
- collection of buttons
- carpeted room
- two pie tins

Directions

1. Take off your shoes and socks. The buttons are the game markers. Sprinkle the markers around the carpet (be sure to get permission first). Set the pie tins on opposite sides of the room. Each player "owns" one pie tin.
2. One person says "ready, set, go," and the players race to pick up the markers and put them into their own tin. Each player can only use his or her toes to pick up and move the markers. No hands! Players can pick up as many markers in one scoop as their toes can hold.
3. When all the markers have been gathered up, players count to see who has the most markers. That person is the winner!

Further Fun

Try playing with more than two players. The more people that play, the wackier the game!



19

Sun Silhouettes

1

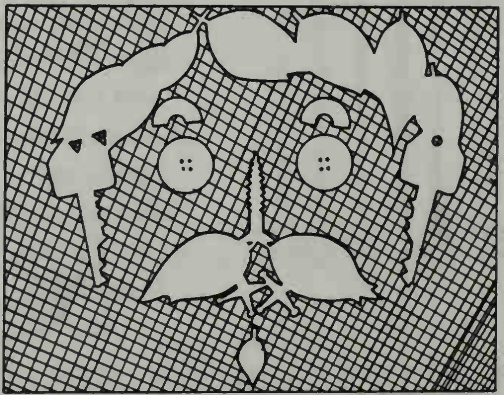
These sun silhouettes are a "bright" idea!

What You'll Need

- sunny day
- sun printing paper (available at toy, hobby, or nature shops)
- small objects with distinctive outlines (such as leaves, keys, or jacks)
- shallow pan of water
- silver or gold glitter
- marking pens
- glue stick
- clear tape

Directions

1. Gather all your materials first. The sun paper is light sensitive, so leave it in its packet until you need it.
2. Find a place outdoors that gets direct sunlight but is protected from the wind. Set down one sheet of sun paper. Use your shadow to shade the sun paper while you arrange your objects on it. Then step aside and leave the paper in the sun for five minutes.
3. Remove the objects and put the print into the pan of water. The water makes the silhouettes permanent. Lay the print in a safe, shaded place to dry. While your first print is drying, you can make another, and another, and another. Practice playing with different arrangements or using new objects to make your silhouettes.
4. Color the prints with marking pens, then use the glue stick and silver or gold glitter to decorate them.
5. Hang your prints in your room, or tape a few together to wrap small gifts.



20

Adobe Abode

3

Mud, glorious mud! In this two-day project, re-create a miniature mud house.

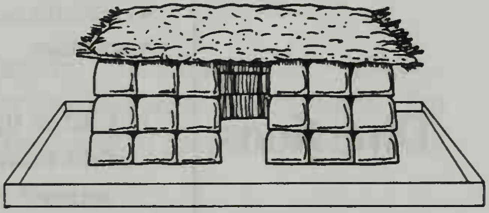
What You'll Need

- 6 cups dirt
- 4 cups water
- big bowl
- large mixing spoon
- 1 cup grass clippings
- four empty ice cube trays
- nonstick cooking spray
- shoe box lid
- pencil
- several long twigs

Directions

DAY 1

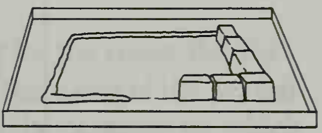
1. Mix only 4 cups of dirt and 3 cups of water in the bowl until you have thick mud. The mixture should be able to drip in globs down the spoon, but not be runny. Stir in 1/2 cup of grass clippings and mix well.



2. Spray the inside of the ice cube trays with nonstick cooking spray. Fill the ice trays with the mud mixture and let it sit overnight in a warm, dry place.

DAY 2

3. After school, turn over the ice cube trays to remove the dried adobe bricks. Mix up the last 2 cups of dirt and cup of water to make a mud paste. Turn the shoe box lid facedown. Draw a rectangle about half the size of the box top inside the lid to show where the house walls will go.
4. Put down a layer of mud paste over the lines of the rectangle. Leave an open space at one end of the house for a door opening. Set a layer of bricks into the paste, then put down a layer of paste on top of this first layer of bricks. Continue building until you have four good-sized walls. Then set it aside to let the paste dry for thirty minutes.



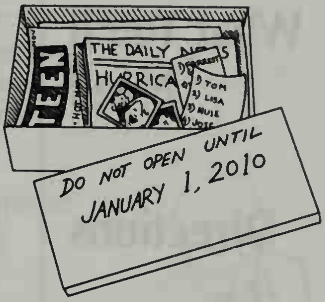
5. Spread any remaining paste around the top of the house. Lay the twigs across the tops of opposite walls, sticking them into the wet paste. Fill in any holes in the roof with the extra grass clippings, then cover the roof with mud paste. Let dry overnight. You now have your own adobe abode!

21

Time Capsule

1

Do you laugh at pictures of the clothing and hairstyles people wore years ago? Set up this time capsule, and you may be laughing at yourself in a couple of decades!



What You'll Need

- recent magazines and newspapers
- movie ticket stub (with price)
- pictures of yourself, friends, and family
- shoe box with lid
- several sheets of plain white paper
- colored pens
- construction paper
- duct tape

Directions

1. Gather up one or two copies of your favorite magazines, a current newspaper, a movie ticket stub, and a few current photos of yourself and your family (get a parent's permission first). Place these items in the shoe box, which will be your time capsule.
2. On the paper, write down lists of your favorite books, your school friends, and your favorite movies or TV shows. Stick them in the time capsule. Make a schedule of your typical day or week and add that to the time capsule, as well.
3. Have your best friend write a note to you, telling you about the activities he or she likes to do with you. Without reading it, put the note in the capsule.
4. Finally, with the construction paper and pens, make a small sign that says "This time capsule was created on . . ." and fill in the date, time, and year. Put the sign into the capsule. Close the capsule with its lid. Seal the time capsule securely by wrapping it over and over with duct tape.
5. Pick a date in the future—five or even ten years from now—when you will open it. (The longer you wait, the more fun you will have when you finally do open it.) On top of the time capsule, write in big bold letters "DO NOT OPEN UNTIL . . ." and write the date on which you want to open it. Then store it someplace where it won't get lost!

22

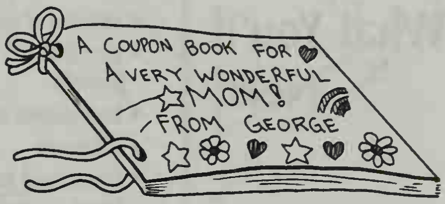
Captivating Coupons

2

Coupon books are fun to create and make extra-special presents for those you love.

What You'll Need

- notepad
- ballpoint pen
- ruler
- scissors
- construction paper
- colored pens
- hole punch
- yarn



Directions

1. Think of all the people you depend on during the day—your mom or dad, an older brother or sister, even a good friend. You can make a book for one of these special people or make books for all of them.
2. With the notepad and pen, make a list of things you can do to help that person. For example, a big brother might appreciate having you do the dishes for him one night. Or a mother might love a few hours of baby-sitting.
3. Pick three or more activities from your list. Make one coupon for each activity. A good size for each coupon is 4¼ inches wide by 5½ inches long. Measure and cut one piece of colored paper for each of your coupons.
4. On one of the pieces of construction paper, write "This coupon is good for . . ." and write in one of the favors. For example, "This coupon is good for taking out the trash any day of the week." Put only one activity on each coupon. Decorate each coupon as you wish.
5. Cut another piece of construction paper for the cover. Use the pens to decorate it. Include your name, the name of the person for whom you are making the book, and the occasion for which it's being given, if there is one. Arrange the coupons, with the cover on top. Using the hole punch, put two holes along the left side of the coupon book. Then cut two pieces of yarn in 8-inch lengths. Feed the first piece of yarn through the first hole, and tie it into a bow. Do the same with the second piece of yarn. Now it's ready to present. Once your coupon book is finished, don't forget to honor each and every coupon!

23

Radical Rocket

3

Adventures in outer space await you aboard your own cosmic creation—and it only takes two days to make!

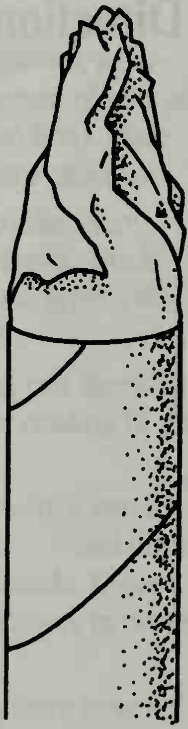
What You'll Need

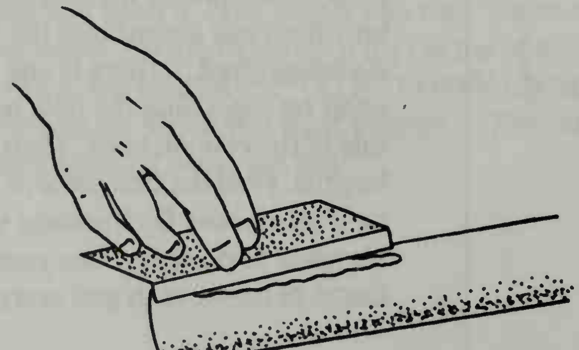
- several sheets of newspaper
- cardboard tube from a roll of paper towels
- two paper towels
- scissors
- front and back cardboard panels from a cereal box
- white glue
- 1 cup liquid laundry starch
- shallow baking pan
- newspaper, cut into fifteen long, 2-inch-wide strips
- hobby paints and small paintbrushes
- ten strips of aluminum foil, each about ⅛ inch wide by 5 inches long

Directions

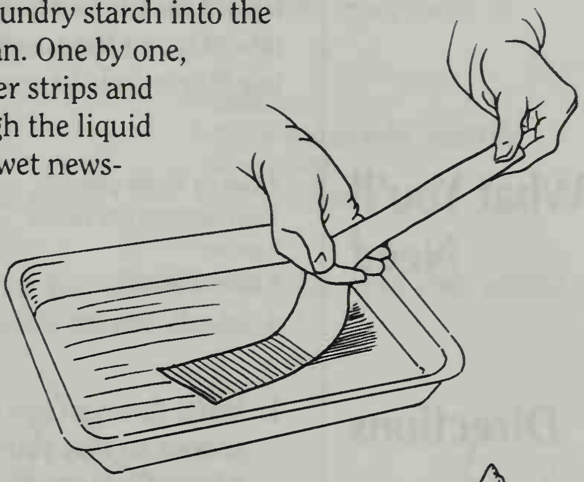
DAY 1

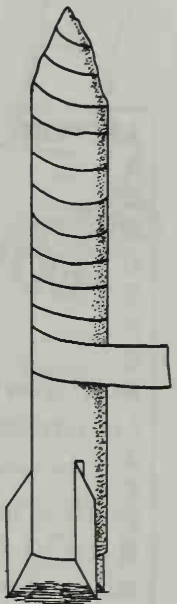
1. Spread out newspaper to cover your work area.
2. Set the cardboard tube, which will be the body of your rocket, on the newspaper. Slightly dampen the two paper towels, crumple them up together, and stuff them halfway into one end of the tube. Mold the remaining part of the damp towels into a pointed cone for the nose of your rocket.
3. Your rocket will need some launching legs. Cut out three legs from the cardboard cereal box panels. On the inside edge of each leg, fold in a ½-inch flap, which you will then glue onto the rocket. Let them dry for ten minutes.





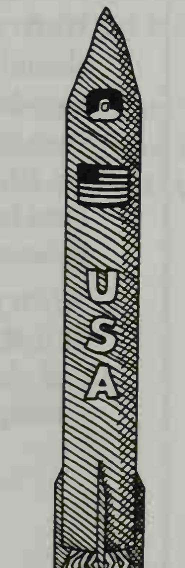
4. Pour the liquid laundry starch into the shallow baking pan. One by one, take the newspaper strips and drag them through the liquid starch. Pull each wet newspaper strip through two of your fingers to remove any excess starch. Wrap the rocket in newspaper strips, making sure to cover all the parts so that the nose, body, and launching legs appear to be one unit. Let your rocket dry overnight.





DAY 2

5. Once your rocket is completely dry, paint it. You might want to put the name of a country on the side of the rocket, paint a country flag, or paint on windows with an astronaut peeking out.
6. During launch, a bright fuel fire usually burns from a rocket's engines. You can get this look of the sparkling fire by taking the strips of foil and gluing them to the bottom of the rocket. Now you're ready for takeoff!



24

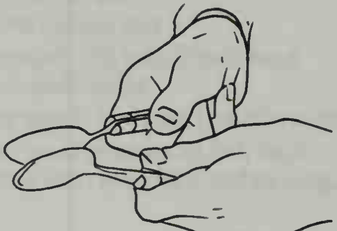
Spoon Messages

2

Before telephones or radios, people communicated over long distances using the sound signals of Morse code. You and a friend can use Morse code to send secret messages back and forth.

What You'll Need

- two or more players
- two spoons per player
- paper
- pen or pencil



Directions

1. Write down a copy of the Morse code for each player. Hold the spoons so that you can tap the backs of them together to make a loud clicking sound.
2. In Morse code, every letter is represented by a series of short or long clicks. Timing is important, because the length of time between each click tells the listener whether he or she is hearing a short click or a long click. For example, to make the sound clicks for the letter *B,* click your spoons together once, pause, then click them together three times quickly. It's the pause that makes a click long.
3. To use the code, sit across a room from your friend. Ask "What word am I making?" then make the correct series of clicks. When you first play this game, the person making the clicks should pause after each letter to give enough time for the decoder to decode that letter. Once the decoder says "Okay!" then the person doing the clicking can move on to the next letter. (Once you get really good at hearing the letters, you won't need to stop after each letter. You can simply add long pauses between letters and extra-long pauses between words.)
4. When you've got the words down, it's time to send messages. At first, choose messages that are short. If you like this game and play it often, you may be able to create and understand messages without even having to look at your decoder list!

LETTERS:

A	·—
B	—···
C	—·—·
D	—··
E	·
F	··—·
G	——·
H	····
I	··
J	·———
K	—·—
L	·—··
M	——
N	—·
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25

A Whale of a Secret!

1

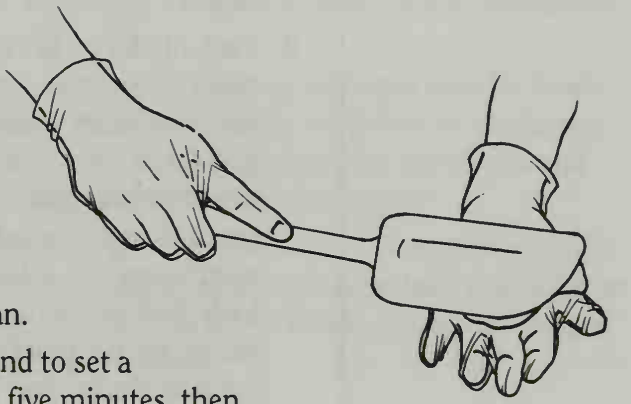
How do whales keep warm in icy seas? Try this experiment to discover every whale's secret!

What You'll Need

- large bucket
- cold water
- two trays of ice
- pair of disposable plastic gloves
- spatula
- tub of lard or solid vegetable shortening
- kitchen timer

Directions

1. Fill the bucket three-quarters full with cold water, then empty the ice from both ice trays into the bucket.
2. Put on the gloves. Use the spatula to completely cover one hand with lard or shortening. Leave the other gloved hand clean.



3. Use the clean hand to set a kitchen timer to five minutes, then plunge both hands into the bucket of ice water.
4. Watch the timer to find out how long you can keep each hand in the ice water. Don't let either hand get too cold before you pull it out!
5. How come one hand stayed so toasty warm? The lard or shortening acts just like a layer of whale blubber. It's pure fat and it helps keep the warmth in and the cold out. A layer of fat is the secret to how whales stay warm.

26

Famous for a Day

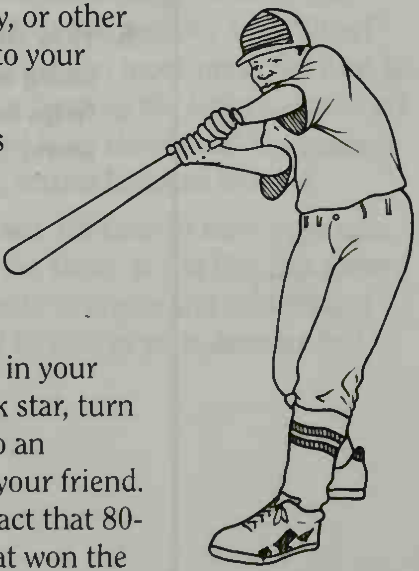
What is it like to be famous? Just imagine. . . .

What You'll Need

- a friend
- a few sheets of 8½-by-11-inch paper, folded in half and stapled
- old magazines that you have permission to cut up
- pen
- scissors
- glue
- colored pencils

Directions

1. You and your friend are famous! Each of you decides whether you are a famous athlete, movie star, politician, chef, doctor, inventor, scientist, author . . . you can pick any profession you want.
2. Each of you makes a journal in which you'll keep notes about your day as a famous person (a few sheets of paper folded in half and stapled into a booklet will do). Imagine what one entire day would be like. Make a list in your journal of the specifics as you imagine them. What time do you need to get out of bed? What does your house look like? Do you and your friend get together to record music, practice a sport, or discuss new medical challenges? Write down as many details as you can about your lives as famous people.
3. Go through magazines and cut out at least five words or objects that would describe or show your lives as famous people. For example, a movie star might have special cars, expensive jewelry, or other luxuries. Glue the cutouts into your journal.
4. Using your list from Step 2 as a guide, reenact a few minutes of your famous life by spending a bit of time doing what you, as a famous person, do best. If you are a writer, write a story in your daily journal. If you are a rock star, turn on a rock radio station and do an impromptu performance for your friend. If you are a football star, reenact that 80-yard run (outside, please!) that won the game for your team.



27

Mystery Messages

2

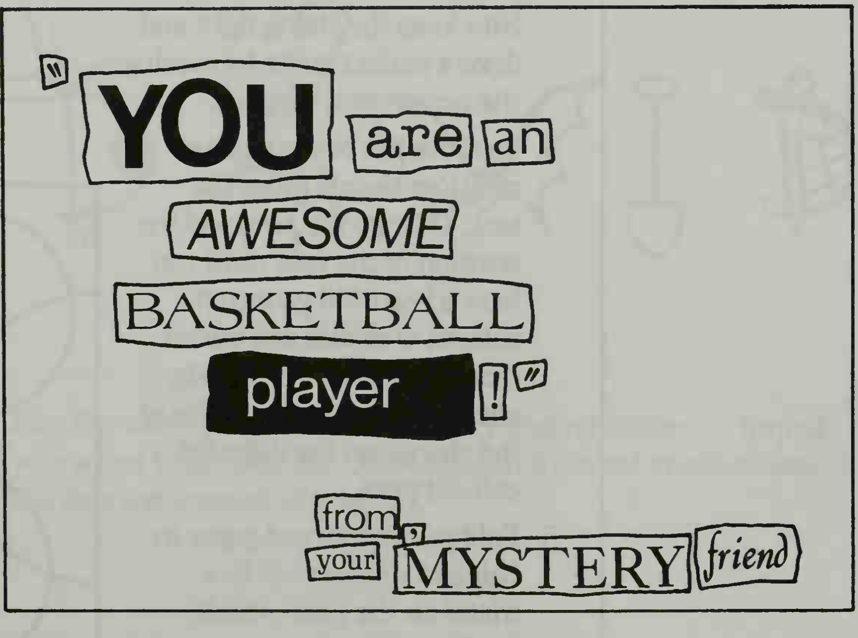
Surprise someone you care about with a special message from an "anonymous admirer"!

What You'll Need

- pen or pencil
- scratch paper
- old magazines or newspapers that you have permission to cut up
- scissors
- glue
- construction paper

Directions

1. Think of something nice you'd like to tell someone you care about. Do you think he or she gives the best hugs in the world? Does this person always take the time to listen to you? Decide what you would like to say and write it down in one or two sentences on the scratch paper.
2. Go through the magazines and newspapers and look for headlines and advertisements that contain the letters or words you need to create your note. Cut out and arrange the letters and words on a table so they spell out your message.
3. Glue the cutouts, in order, onto the construction paper, and let the glue dry. Fold your thoughtful message in half, and put it in a place where the recipient is sure to find it. Or you can drop it in the mail to the lucky person.



28

Spiro-Designs

2

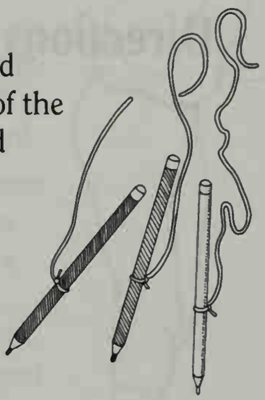
Around and around and around it goes, the design will be made right under your nose!

What You'll Need

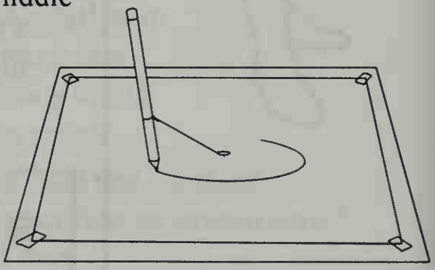
- scissors
- string cut into 4-inch, 6-inch, and 8-inch pieces
- colored pens
- masking tape
- at least one 9-by-12-inch sheet of paper
- one 14-by-14-inch piece of stiff cardboard
- thumbtack

Directions

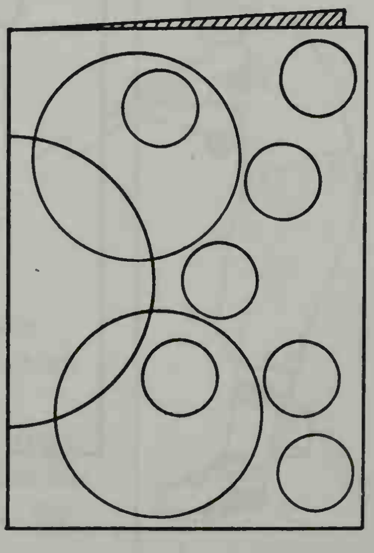
1. Take the 4-inch piece of string and tie one end around one of the colored pens. Tie one end of the 6-inch piece of string around another colored pen. Then tie one end of the 8-inch piece of string to another pen.



2. Place the paper onto the cardboard and tape down the corners.
3. Tie a knot in the loose end of one of the pieces of string. Put the tack through the knot, then push the tack into the middle of the paper. Hold the tack in place with one hand (to make sure it doesn't come loose) and pull the pen until the string straightens. Now keep the string tight and draw a perfect circle by moving the pen around the tack.



4. To move the pen into a new position, simply move the tack. Change the pens and the position of the tack until you have a beautiful geometric pattern of circles and curves (partial circles). For variety, you can change the lengths of the strings on the different colored pens.
5. Fold your patterned paper in half and write a note to a friend on the plain, inside portion of the paper.



29 Name Game

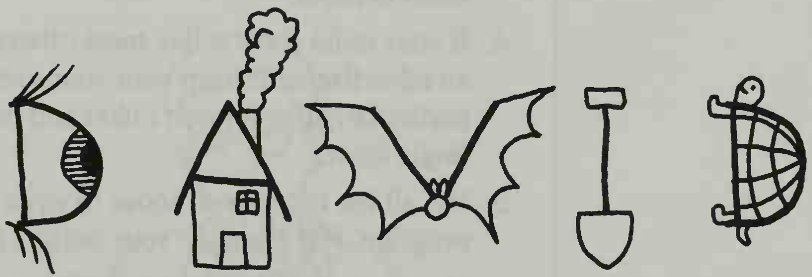
You never know what could be hidden in your name. . . .

What You'll Need

- colored pens
- 8½-by-11-inch piece of paper

Directions

1. Write your name in big capital letters on the paper. Leave lots of room around each letter.
2. Look at your name as if you've never seen it before. Turn the paper sideways; look at it upside down. Examine closely the shape of each letter. With a little creativity, those letters could be transformed into extraordinary objects or animals. For example, if you have the letter *B* in your name, you can turn the *B* flat on its back and use the bumps to make the humps of a camel. The letter *D* could become a turtle or the back of a bus. What can you come up with? See how many objects and animals you can create using the letters of your name.
3. For a real challenge, choose a fun theme such as "at the amusement park" or "at the toy store." Then transform each of the letters of your name into items or objects related to your theme.



Further Fun

Play the name game with a friend. Try trading names, or timing yourselves to see who can come up with the most creative ideas in the shortest amount of time.

30

DJ for a Day

1

It's time to rock and roll, hip and hop, or bring the classics home. It's your own radio show, where you pick the music and talk the talk that will bring your station to the top!

What You'll Need

- radio
- pencil
- paper
- blank cassette tape
- tape recorder

Directions

1. Decide what kind of radio station you want to create. Is it a classic rock, heavy metal, country, or classical music station? Turn on your radio to find a real station that plays the kind of music you've chosen, then turn down the volume while you create the outline for the script of your show.
2. Figure out what your radio personality name will be (you can use your real name or make up a funny name) and the name of the station. Write them down at the top of the paper.
3. No matter what kind of station you develop, there's bound to be a news broadcast between the songs you play. Think of current events at your school, in your community, or even in the world. You can even make up news events. List them on your sheet of paper.
4. If your radio show is like most others, you'll have to break for an advertisement from your sponsors. Think of a product you particularly like (or don't like) and make up a silly advertising jingle for it.
5. Use all the notes from above to write out an outline for your program. For example, your outline might look like this:
   a) a welcome (this is Wanda Witherspoon reporting)
   b) station identification (you're listening to KXYZ, 98.7 FM)
   c) identify the type of station (playing country morning, noon, and night)
   d) break for a song
   e) top news stories of the day
   f) advertisement for the show's sponsor
   g) break for another song
   h) a sign-off (your name and station identification again)

6. Practice announcing all the parts of your show two or three times. When you're ready, record your broadcast on a blank cassette tape on the tape recorder. When it's time for a music break, turn up the real radio in the background to catch one of their songs or play a song from your personal music collection.
7. When you're finished recording, rewind the tape and listen to your show. If it's not quite right, you can start over until your show is just the way you want it.
8. Play your broadcast for your family after dinner.

Further Fun

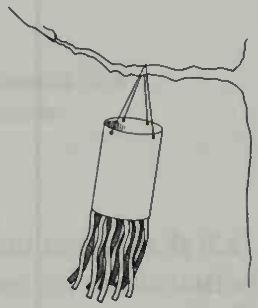
Arrange for an adult to take you and some friends on a tour of a *real* radio station. Maybe you can even interview someone at that station for your own radio program!

31

Windsock Wonder

3

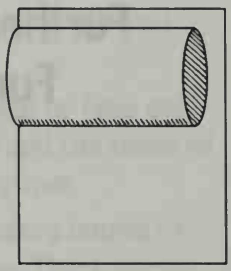
PARENTAL SUPERVISION RECOMMENDED
A breezy day is all you need to show off this colorful creation.



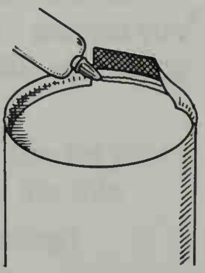
What You'll Need

- scissors
- empty 18-ounce oatmeal container
- 9-by-14-inch piece of colored fabric
- white glue
- seven 12-by-2-inch pieces of colored fabric
- hole punch
- four pieces of string

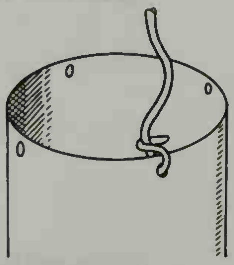
Directions



1. Use the scissors to cut the bottom out of the oatmeal container so that both ends are open—you may want to get a parent to help you with this step. Center the container on its side over the large piece of fabric. Line up the top of the container with the top edge of the fabric. An extra inch of the fabric should hang down below the bottom edge of the oatmeal container.
2. Wrap the sides of the fabric around the container and glue the fabric in place. The fabric should cover the entire container. Allow it to dry for at least twenty minutes.
3. Take the extra inch of fabric that is hanging down from the bottom of the container and fold it inside the container, then glue it down. Glue the long fabric strips to the inside of the bottom of the container, so that they hang down like a skirt.



4. Use the hole punch to punch out four holes from the top of the oatmeal container. Tie a piece of string, about 10 inches long, through each hole, then tie all four pieces together, forming a knot at the top. Take the windsock outside and use the tied string to hang it from a branch or a hook on your front porch. Now watch the wind *sock* it around!



32

Blooming Terrarium

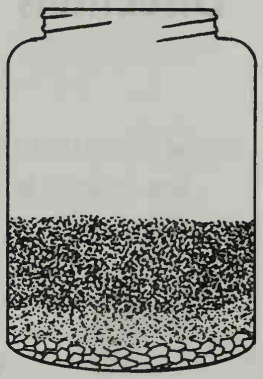
2

Create a small, living world and watch it grow!

What You'll Need

- gravel
- large, wide-mouthed glass jar with lid
- granular-activated charcoal (available at garden shops)
- potting soil (available at garden shops)
- small plants, including any roots and a bit of the soil, gathered from outside (mosses, mushrooms, and ferns are good plants to try)
- rocks
- sticks or pieces of branch
- bottle opener

Directions



1. Place ½ inch of the gravel in the bottom of the jar, followed by ½ inch of the charcoal. The gravel will keep excess moisture away from the plants. The charcoal will absorb acids that the plants give off as they grow. Without the charcoal, the terrarium's environment will become too acidic, and the plants will die.
2. Next, add about 3 inches of the potting soil and just enough water to make the soil damp. Carefully place the small plants in a pleasing arrangement in the jar, burying any roots into the soil.
3. Last, gently add a few pretty rocks and sticks to make the terrarium seem like a woodland scene. Screw on the jar's lid, and use the triangular end of a bottle opener to poke four holes in the lid for the plants to breathe. Place the terrarium in a sunlit room, but not in direct sunlight.
4. Terrarium plants don't need very much help to grow—just a little moisture, sunlight, and fresh air. Be careful not to overwater it—a few teaspoons of water each week should be enough. If the terrarium gets too wet, take off the lid for a few days and let the extra moisture evaporate.

33 Liquid Rainbow

3

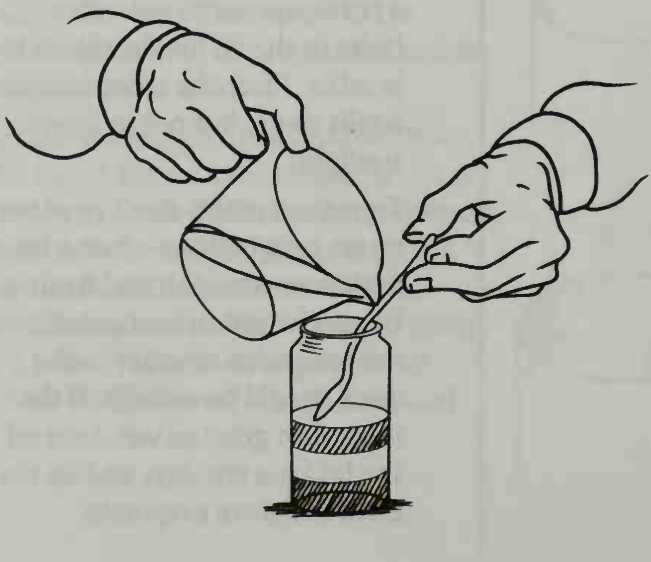
Make a liquid rainbow right in your kitchen! It takes a slow and steady hand, but the results will look magical!

What You'll Need

- newspapers
- measuring cup
- ¼ cup corn syrup
- food coloring (green, yellow, red, and blue)
- mixing spoon
- tall 8-ounce jar
- ¼ cup cold water
- measuring spoons
- 2 teaspoons salt
- teaspoon
- ¼ cup warm water
- ¼ cup rubbing alcohol

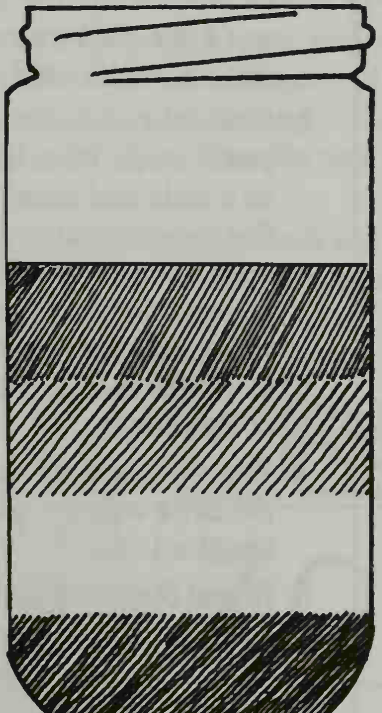
Directions

1. Lay the newspapers out on a kitchen counter where you will be working. Fill the measuring cup with ¼ cup corn syrup. Add 2 drops of green food coloring and stir. Pour the green corn syrup into the jar. Try not to get any on the sides of the jar.
2. Wash the measuring cup thoroughly, then fill it with ¼ cup *cold* tap water. Add 2 teaspoons salt and stir until the salt is dissolved. Add 4 drops of yellow food coloring and stir.
3. This next step is very important. You need to pour the yellow saltwater into the jar in a way that keeps the corn syrup and the saltwater from mixing together. To do that, carefully lower a teaspoon into the jar until it hovers just above the green corn syrup. Put the spout of the measuring cup right up against the spoon handle, and slowly pour the saltwater down the handle of the spoon and into the jar. The saltwater should form a layer on top of the corn syrup.



4. Wash the measuring cup again and fill it with ¼ cup *warm* tap water. Add 4 drops of red food coloring and stir. Use the spoon technique mentioned in Step 3 to gently pour the red water into the jar. The red water should form a layer on top of the yellow saltwater.
5. Wash the cup again, then measure ¼ cup rubbing alcohol. Add 2 drops of blue food coloring and stir. Use the spoon technique to pour the blue rubbing alcohol into the jar. The rubbing alcohol will partially mix wih the red water and also form a layer on top.
6. Step back and admire your rainbow!

Warning: Do *not* swallow this mixture or leave it unattended where someone might mistake it for a drink. The rubbing alcohol and saltwater can make a person extremely ill if swallowed.



34

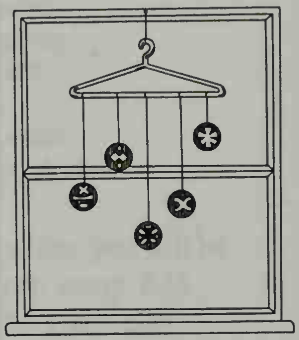
Stained "Glass" Mobile

2

These creative circles capture the colors of the rainbow and bring them right into your home!

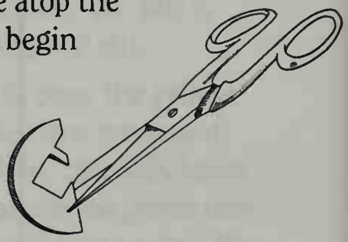
What You'll Need

- lid to peanut butter or mayonnaise jar
- black construction paper
- colored cellophane wrap in at least three colors
- nylon fishing line, cut in 5-, 7-, 9-, 11-, and 13-inch pieces
- pencil
- glitter
- scissors
- wire hanger
- glue

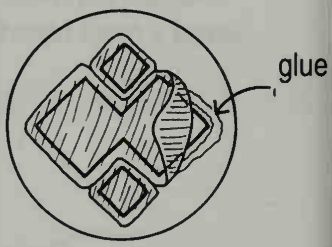


Directions

1. Place the jar lid on the construction paper and trace ten circles. Cut out each circle. You'll need two circles for each "window" that will hang from your mobile.
2. Take two of the circles and stack them one atop the other. Now fold the two circles in half and begin cutting squares, triangles, or any other shape from the *creased* side of the circle. You can cut the circles any way you'd like, but be sure to leave the outside edge of the circles intact.



3. Unfold the circles to see the pattern you've made. Place the two circles down on a table, and move the top circle aside. Cut a piece of colored cellophane for the open space in your pattern. Make the cellophane slightly larger than the open space, and glue it in place. Then glue one of the pieces of the fishing line to the top of the pattern.



4. Take the black cut-out circle that you set aside and glue it onto the circle with the cellophane, aligning cut-out sections. Allow the glue to dry.
5. Repeat Steps 2, 3, and 4 until you've created five windows. Decorate the edge of each small window by gluing on some glitter.
6. Tie the loose end of each piece of fishing line onto the hanger, fasten it in front of a window or another well-lit spot, and enjoy the rainbow of colors!

35 Create a Critter

2

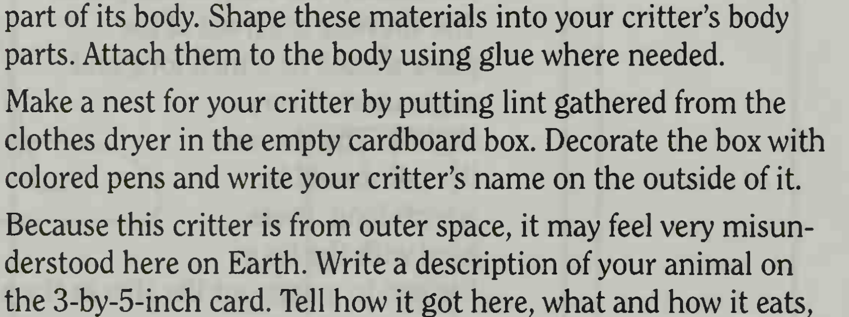
A strange spirit creature from outer space has become stranded on Earth and needs your help. Can you give it a body to live in, a nice nest to sleep in, and a place to call home?

What You'll Need

- old tennis ball
- pipe cleaners
- empty spools of thread
- construction paper
- clay
- scissors
- glue
- dryer lint
- small, empty cardboard box (such as a tissue box)
- colored pens
- white 3-by-5-inch index card

Directions

1. Decide what kind of body to give your critter. The tennis ball makes a good starting point. Use such objects as pipe cleaners, spools of thread, construction paper, and clay to add legs, wings, antennae, eyes, or anything else you think your critter needs as part of its body. Shape these materials into your critter's body parts. Attach them to the body using glue where needed.
2. Make a nest for your critter by putting lint gathered from the clothes dryer in the empty cardboard box. Decorate the box with colored pens and write your critter's name on the outside of it.
3. Because this critter is from outer space, it may feel very misunderstood here on Earth. Write a description of your animal on the 3-by-5-inch card. Tell how it got here, what and how it eats, and what its own planet is like. Place the note card inside your animal's nest.
4. Show off your alien critter to your friends and family. And be sure to take good care of it. After all, it's depending on you!


THE ZOTZ CAME IN A ROCKET FROM ZOTO-A PLANET COVERED BY RAINFOREST. IT LIKES TO EAT BUGS, ESPECIALLY FROM OUR GARDEN!
ZOTZ

36

Foam Glider Plane

3

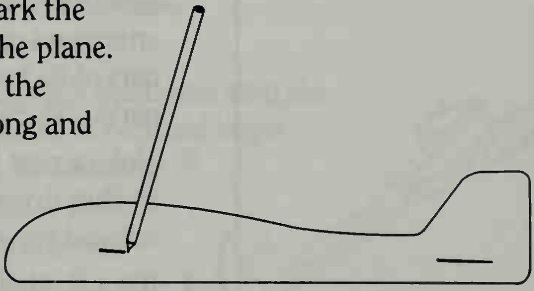
It sails through the air with the greatest of ease, and you probably won't get in trouble for flying it in the house!

What You'll Need

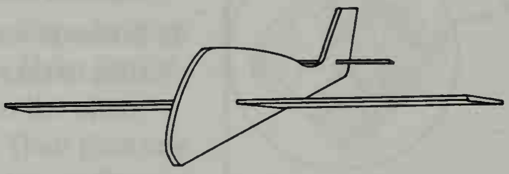
- scissors
- foam egg carton
- pencil
- ruler
- ballpoint pen
- two or three paper clips

Directions

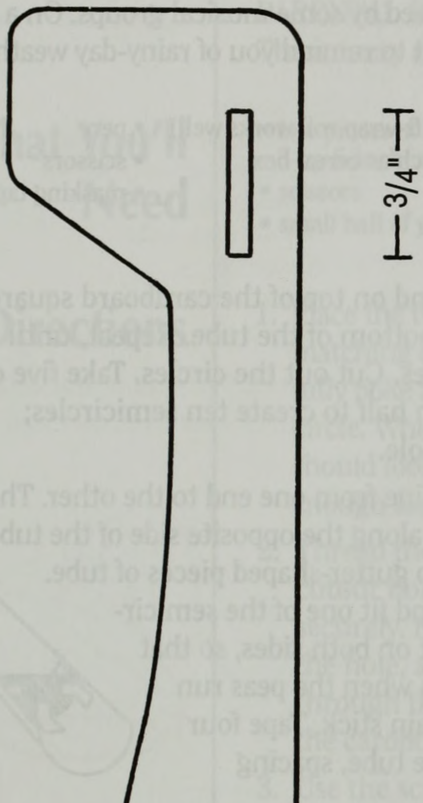
1. Cut out the flat, top panel of an egg carton. Use a pencil to copy the pattern of the three plane pieces pictured on the next page onto the carton. Use the ruler to make sure that the large wing is 1 inch wide and the small wing is ¾ inch wide. Cut out each piece.
2. Use a ballpoint pen to mark the two slits on the body of the plane. The slit near the front of the plane should be 1 inch long and angle upward very slightly. The slit near the tail should be ¾ inch long. Press hard with the tip of the pen to gouge out the slits in the plane.



3. Slide the 1-inch-wide wing through the 1-inch slit in the front of the plane, and the ¾-inch-wide wing through the ¾-inch slit in the back of the plane. Eye your plane from the top, front, and sides to check that the wings are placed evenly from side to side.



4. Toss your plane in the air for a test flight. The main wing can be adjusted up if the plane goes down nose-first, or down if the plane flies upward too sharply. To make the adjustment, pull out the main 1-inch wing and use the tip of the pen to gouge out a new angle (that is, make the slit angle higher or lower) in the front slit. As long as you don't change the 1-inch width of the slit, the wing will stay in place even with a slight space above or below the wing. You can also try adding a paper clip or two to the body (anywhere between the wings) to change the flight patterns of your plane.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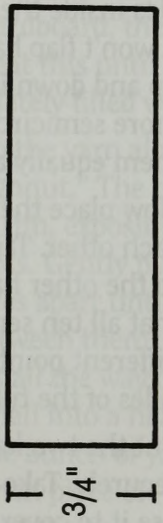
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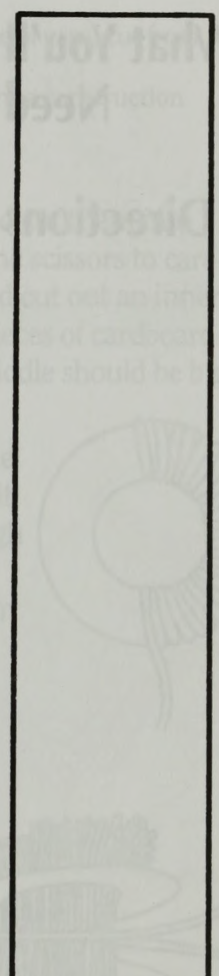

1"

37

The Sunny Day Rain Stick

3

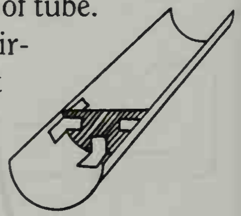
A rain stick is an instrument used by some musical groups. On a warm spring day, you can use it to remind you of rainy-day weather!

What You'll Need

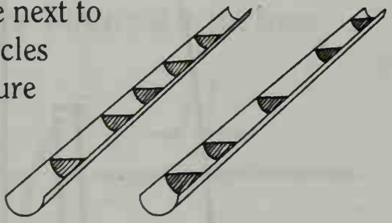
- long cardboard tube (an empty gift-wrap roll works well)
- small square of flat cardboard (such as cereal box cardboard)
- approximately 2 cups of split peas
- pen
- scissors
- masking tape

Directions

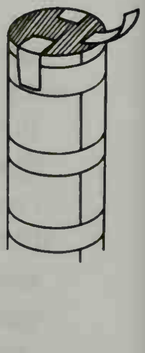
1. Stand the tube up on its end on top of the cardboard square. Trace a circle around the bottom of the tube. Repeat, until you have made seven circles. Cut out the circles. Take five of the circles and cut them in half to create ten semicircles; leave two of the circles whole.
2. Cut the tube in a straight line from one end to the other. Then make another straight cut along the opposite side of the tube. You should be left with two gutter-shaped pieces of tube. Take one half of the tube and fit one of the semicircles inside the tube. Tape it on both sides, so that it won't flap back and forth when the peas run up and down inside your rain stick. Tape four more semicircles inside the tube, spacing them equally apart.



3. Now place the two halves of the tube next to each other. Tape the last five semicircles to the other half of the tube. Make sure that all ten semicircles are placed at different points along the two sides of the tube.



4. Put the two halves of the tube back together and tape securely. Take one of the whole cardboard circles and use it to cover one end of the long tube. Tape the circle in place. Pour the peas into the open end of the tube, then cover the open end with the last cardboard circle and tape it in place.



5. Turn the tube upside down to hear the "rain." A slow turn gives you a gentle rainfall, while a quick turn imitates the sound of a downpour!

38

Furry Friend

2

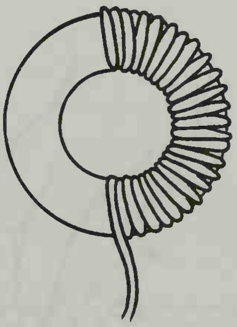
PARENTAL SUPERVISION REQUIRED
These fuzzy critters are a ball of fun to make!

What You'll Need

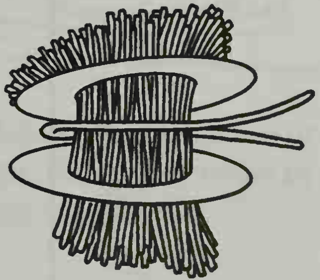
- two pieces of thick cardboard, 5-by-5-inches square
- scissors
- small ball of yarn, any color
- 12-inch piece of yarn, cut from the ball
- black and white construction paper
- white glue

Directions

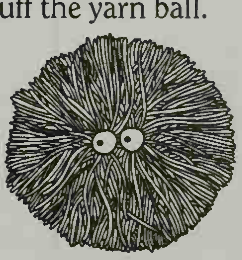
1. Place the two squares of cardboard together and cut them into matching circles. Have an adult help you use the scissors to carefully poke a hole in the middle of the circles and cut out an inner circle. When you're finished cutting, the two pieces of cardboard should look like doughnuts. The hole in the middle should be big enough for the ball of yarn to pass through.



2. Thread the end of the ball of yarn through the cutout hole of *both* cardboard pieces and tie it securely. Now begin wrapping the yarn through the hole, around the cardboard, then back through the hole. Repeat this until the hole in the cardboard is completely filled with yarn.



3. Use the scissors to snip the yarn along the entire rim of the "doughnut." The cut yarn will fall away from the rim, exposing the two cardboard pieces. Gently pull the two cardboard pieces apart until there is a slight gap between them. If you pull the two pieces all the way off the yarn, the yarn will fall into a heap at your feet. To keep the bunch of yarn together, take the 12-inch piece of yarn and slide it between the two cardboard pieces, then tie it in a tight knot around the yarn pieces. When the knot is secure, slowly pull the two pieces of cardboard off the yarn. Fluff the yarn ball.



4. Cut the construction paper to make eyes, then glue them onto your fuzzy friend. Make large and small fuzzies using different sizes of cardboard doughnuts.

39

Recycled Paper

3

Making recycled paper is an excellent way to turn junk mail into something exotic and expressive.

What You'll Need

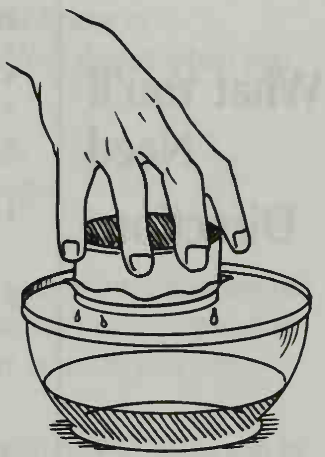
- newspaper
- two large bowls or buckets
- warm water
- blender
- clothes dryer lint
- food coloring
- shallow, recycled tin can (such as a tuna can)
- can opener
- cheesecloth (a fine meshed cloth available at grocery stores)
- rubber band
- four old dishcloths
- dry sponge
- rolling pin
- heavy books

Directions

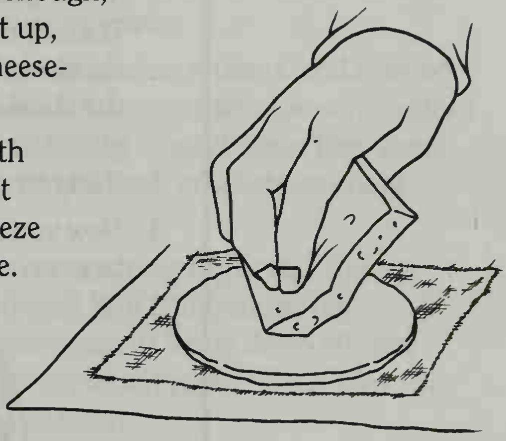
1. Tear the newspaper into 1-inch squares. Fill one of the large bowls with warm water. Put the squares into the bowl and soak for at least half an hour.
2. Pour 2 cups of fresh warm water into your blender, then add a handful of the wet newspaper and a cotton-ball-sized bundle of lint from the dryer. Blend until it forms a thin, bubbly liquid. If the mixture seems too thick, add a little water. Put a few drops of food coloring (any color will work) into the blender and blend again. For darker colors, add more food coloring.
3. The tin can you've recycled should be empty and clean. Use the can opener to remove the remaining lid, so that the can is open from both ends. The shape of the can will determine the shape of your paper—a round can will give you round paper; a square can will give you square paper.

4. Cover one side of the can with cheesecloth. Hold the cheesecloth in place with the rubber band. Pour ½ inch of clear water into the remaining clean bowl. Place the cheesecloth-covered can into the bowl, cloth-side down, letting it sit in the water.

5. Pour 1 cup of the paper mixture into the can, then swish it around. Lift the can out of the bowl. Let the excess water drip back into the bowl. Then place the can on a dishcloth and let it drain for about ten minutes.
6. Move the can to a new, dry place on the dishcloth. Remove the rubber band, and carefully lift the tin away from the paper mixture. Press the flat paper cake with the dry sponge to remove excess liquid. When the paper cake is dry enough, you should be able to pick it up, turn it over, and peel the cheesecloth away.



7. Cover the sheet of paper with another dishcloth and roll it with the rolling pin to squeeze out any remaining moisture. Place it on another dry dishcloth. Now go back to Step 4. Keep making paper cakes until all the paper mixture is gone.



Cover the paper cakes with one last dishcloth, then stack two or three heavy books on top of the dishcloth. Your paper should be completely dry and ready to use in twenty-four hours.

40

Shimmery Shoelaces

1

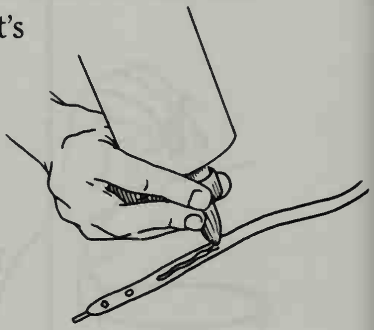
Fancy feet are only a few fun steps away!

What You'll Need

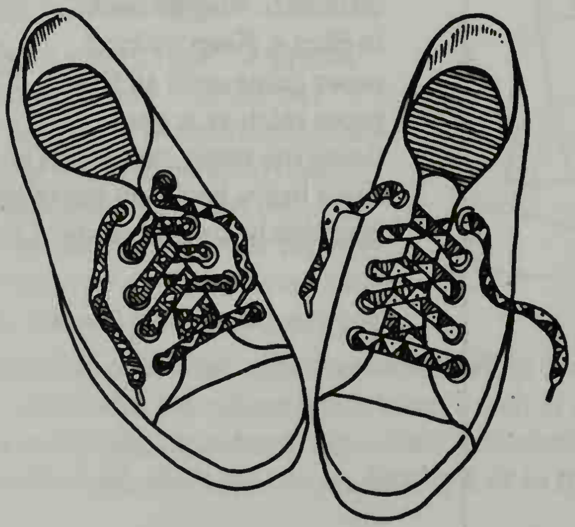
- newspaper
- two pairs of white shoelaces
- colored permanent markers
- white glue
- glitter

Directions

1. Spread the newspaper over your work area and lay out your shoelaces, markers, glue, and glitter.
2. Use the marking pens to color both sides of each lace. You can use one or many colors for each lace—let your imagination go wild! To make rainbow-colored shoelaces, color sections of red, orange, yellow, green, and blue.
3. After the shoelaces have been colored, it's time to add some sparkle. Hold the tip of the glue bottle as if it were a pencil. Then draw a glue design on the shoelaces. Sprinkle the glitter onto the shoelaces wherever you have put glue. Let the glue and glitter dry for thirty to sixty minutes.



4. Now you're ready to replace those plain laces on your shoes with these flashy, colorful creations!



41

Krazy Kountry

1

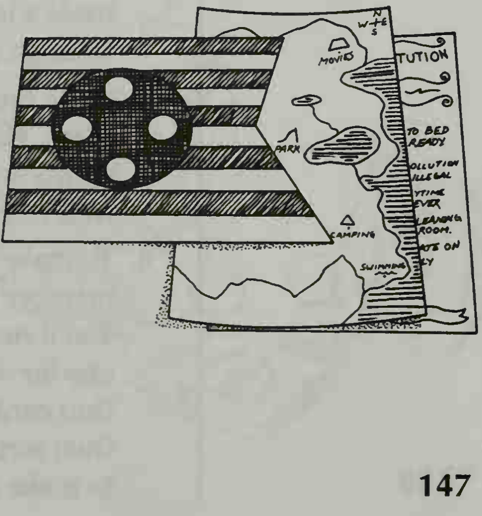
Will you be the King of Krakatoa? The Great Sheba of Shozbotland? The President of Preladonia? You decide when you discover your own new country.

What You'll Need

- colored pens
- colored construction paper
- scissors
- white glue

Directions

1. Imagine you are an explorer. You come upon an undiscovered island with gold mines and no inhabitants. You can spend all the money you want to create whatever country you wish. What do you do?
2. Start by thinking of a name for your country. The name can be silly or serious, depending on your mood and the kind of image you want your country to have. Write the name at the top of a piece of light-colored construction paper.
3. Next, use the colored construction paper, scissors, and colored pens to make the flag. Almost all the flags that represent nations of the world are rectangular. But that doesn't mean that yours can't be circular, triangular, star-shaped, or whatever shape you want.
4. Now decide on the ten laws that are most important to your country. What is legal and illegal? Will children get big allowances paid for by the government? Write down all your laws on a separate sheet of construction paper. These laws will make up your Kountry Konstitution!
5. Draw a map of your country on a sheet of construction paper. Where are the borders? Will there be amusement parks, movie theaters, and jungle gyms?
6. When you are done, hang everything on a bulletin board or on your wall to display your new country.



42

Our Family Board Game

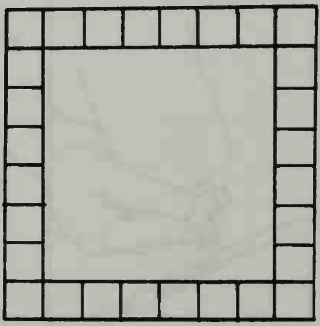
3

So you're in charge of entertainment for the evening's festivities? Turn off the tube, and put together a game your family will never forget!

What You'll Need

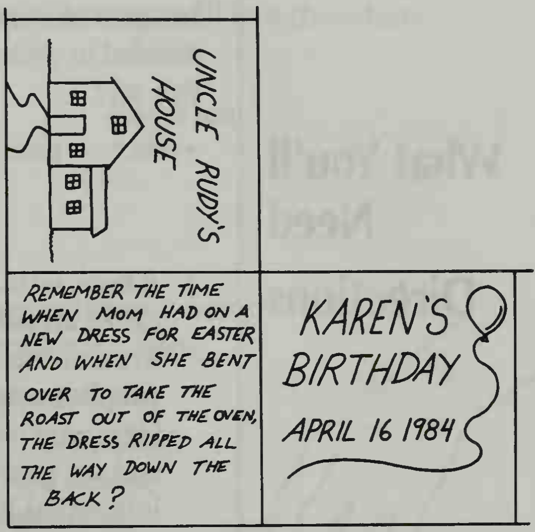
- at least one family member
- ruler
- colored pens
- 2-by-2-foot cardboard square
- pencil
- paper
- scissors
- dice
- family photos that can be cut up (get permission first!)
- white glue
- strips of thin cardboard (made from the side of a cereal box)
- 5-inch-wide square of foil for each game marker

Directions



1. Use the ruler and pens to mark your cardboard so that each side has eight equal sections (see illustration). Choose one corner to be the home base, then color and decorate it.
2. Next, you'll need to write four lists. The first list should be a list of birthdays for seven members of your family. The second list should be a list of seven homes of relatives or close friends you visit often (for example, Grandma's house). The third list should be a list of seven special holidays that are meaningful to your family (for example, Thanksgiving or Cinco de Mayo). The last list should be a list of six favorite family stories that begin with "Remember the time when . . ." For example, "Remember the time when Kelly made a joke while Tim was drinking grape juice and he started to laugh and it all came out his nose?"
3. Write one item from your lists in each square on your board game. Mix up the items so that the birthdays, homes, and events are sprinkled around the board. Decorate your board with colored pens.
4. To make the game markers, carefully cut out each family member from a family photo (remember to get permission!). You'll need at least two game markers, but it's better to have one for every member of the household. Glue a strip of the thin cardboard along the back of each photo to keep it stiff, then scrunch a piece of foil around the bottom of each photo to make a stand.

5. Now you're ready to play. Choose which family member you want to "play." That person's cutout photo will be your marker. Pick carefully because, for the rest of the game, you'll need to talk in that person's voice, say the types of things he or she would say, and use his or her gestures.

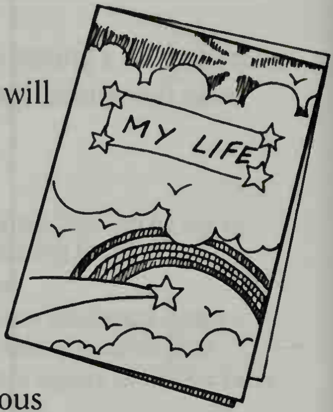

UNCLE RUDY'S HOUSE
REMEMBER THE TIME WHEN MOM HAD ON A NEW DRESS FOR EASTER AND WHEN SHE BENT OVER TO TAKE THE ROAST OUT OF THE OVEN, THE DRESS RIPPED ALL THE WAY DOWN THE BACK?
KAREN'S BIRTHDAY
APRIL 16 1984

6. To see who goes first, each player rolls the dice. The high roller goes first, the player on his or her left goes second, and so on. The first player starts at home base, rolls the dice, then moves his or her marker the number of spaces that are on the dice. In the voice and characteristics of the family member that he or she is "playing," the player must say or do something that that person would do at the event, situation, or place written on the square. For example, if you are using the "Dad" marker and you land on the square marked "Thanksgiving," you might begin snoring if your father is known to fall asleep after a big meal. If you land on someone's birthday, you get an extra turn. Any player who makes a rude comment or puts down a family member loses a turn.

7. Take turns traveling around the board. The first player to go around the board three times is the winner!

43 Through Wizened Eyes

1



Imagine you are eighty years old, and you've decided to write a book about your life. What will you say?

What You'll Need

- pen
- paper
- folder

Directions

1. A book written about one's own life is called an autobiography. Most of the time, autobiographies are written by famous people, such as politicians, actors, and sports stars. Here, you'll use your imagination to journey into the future and see yourself as an old person who has had an exciting and influential life. From the perspective of your older, wiser self, write about what your life "was" like.
2. Make a list of the milestones or great things that you accomplished in your life. Did you go to college, travel the world, raise a family? Make sure you think of at least one big event to put down for every decade of your life. If you're having trouble figuring out what someone in each stage of life might be doing, ask your grandparents, parents, or some older friends.
3. Imagine your one greatest accomplishment. Write it down in detail. If you were a paleontologist, don't just write down that you found some dinosaur bones. What type of dinosaur bones were they? What did newspapers or magazines write about your discovery?
4. Now use your list of milestones and greatest accomplishments to write your autobiography. Keep the pages of your autobiography tucked neatly in the folder. Decorate your folder as you wish.
5. Store your autobiography in a safe, hidden place for the years to come. You may decide to read it again when you're twenty or thirty to see which milestones in your life you've already passed!

Further Fun

This is an excellent activity to do every year or so. As you get older, you'll find you have different priorities and new goals to fit your changing life.

44

A Feast for the Birds

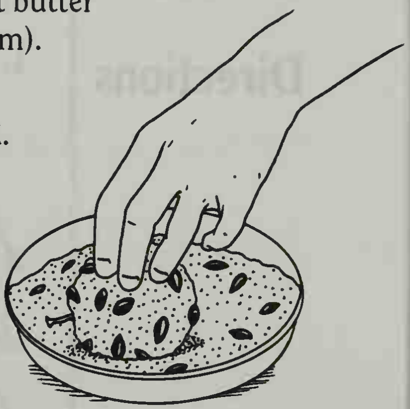
1

The feathery fliers in your neighborhood will love these tasty treats.

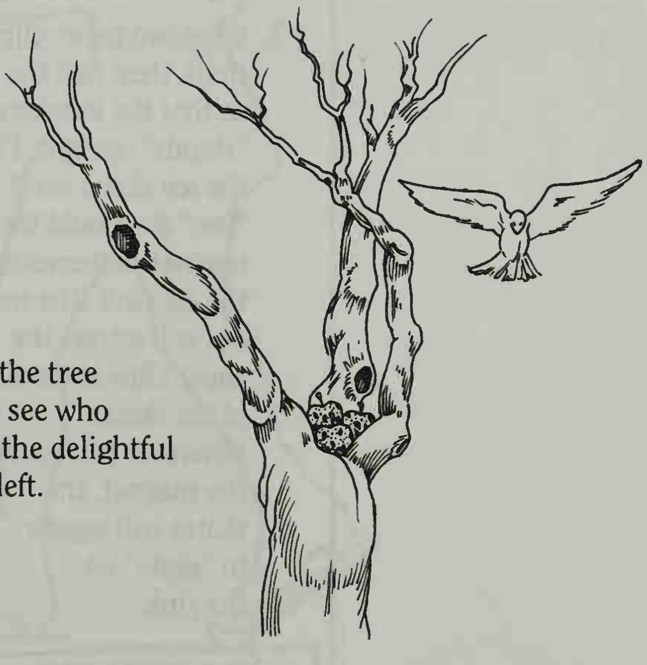
What You'll Need

- dinner knife
- 1 cup peanut butter
- four small apples with stems
- 2 cups birdseed (available at grocery or pet stores)
- small pan
- plate

Directions



1. Use the dinner knife to spread peanut butter all over each apple (except for the stem).
2. Pour the birdseed into the small pan.
3. Roll the apples around in the birdseed. The birdseed will stick to the peanut butter. Keep rolling the apples until all the peanut butter is completely covered by birdseed. Place the finished apples on a plate.
4. Take the plate outside. Find a tree with strong, low branches. Place the apples in the crooks of the tree—where the tree trunk meets a branch. Make sure the apples are steady so that when a bird comes along to peck at them, the apples won't fall out of the tree.
5. Go back into the house and watch the tree from a window to see who appears to nibble the delightful delicacies you've left.



45

Magnetic Ice Rink

3

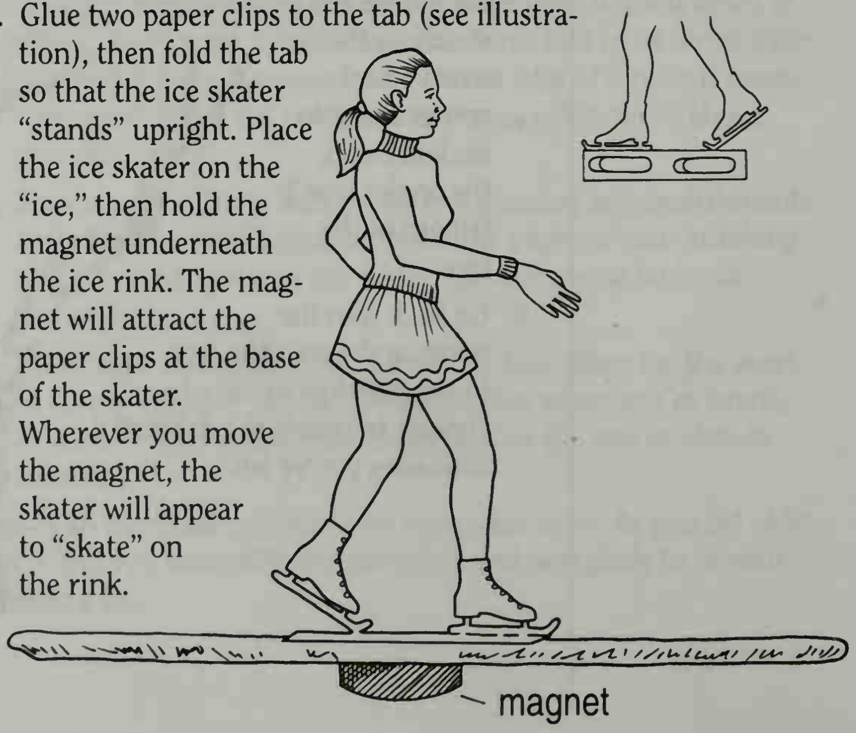
Create a “magic” magnetic skater that seems to whirl and twirl on the ice all by itself.

What You’ll Need

- scissors
- large cardboard cereal box
- aluminum foil
- clear tape
- pencil
- tracing paper
- heavy construction paper
- scissors
- colored pens
- glue
- glitter
- two paper clips
- 1-inch magnet

Directions

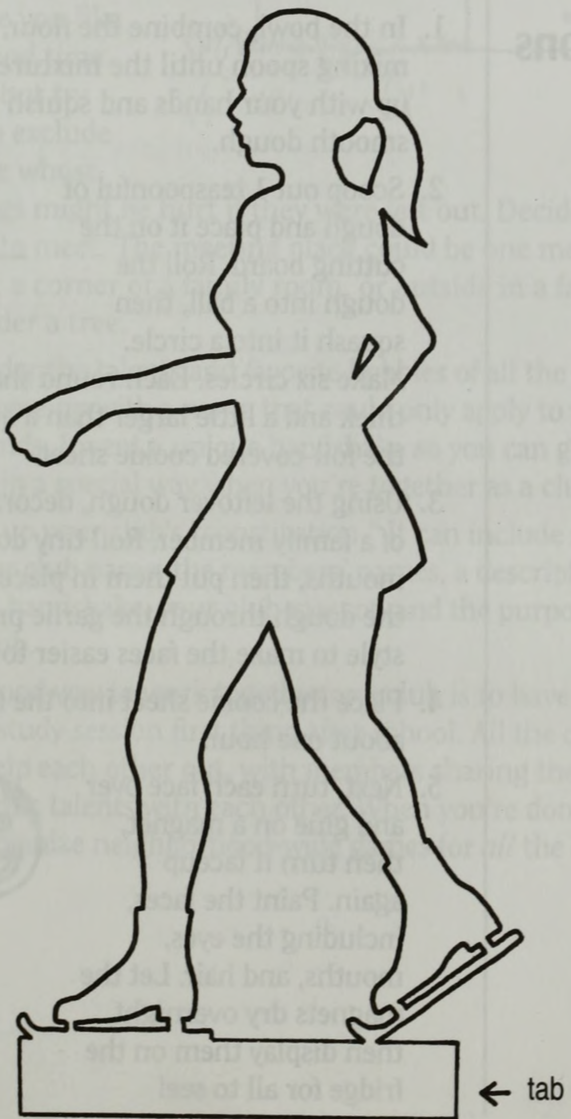
1. Cut out the front panel of the cereal box, then tear off a piece of foil that is a little larger than the cereal box panel. Cover one side of the panel with foil. Keep the foil in place by taping down the edges on the underside of the panel. This is your ice rink.
2. Trace the pattern of the ice skater (see illustration on the next page) onto a piece of tracing paper, and cut it out with the scissors. Make sure not to cut off the tab on the bottom. Using the tracing paper figure as an outline, trace the skater onto a piece of heavy construction paper and cut it out. With the colored pens, draw a face and ice-skating clothes on *both* sides of the paper skater. Glue glitter onto the skater’s outfit.
3. Glue two paper clips to the tab (see illustration), then fold the tab so that the ice skater “stands” upright. Place the ice skater on the “ice,” then hold the magnet underneath the ice rink. The magnet will attract the paper clips at the base of the skater. Wherever you move the magnet, the skater will appear to “skate” on the rink.



4. Practice making different skating moves with your skater. Turn the magnet quickly to make the skater appear to spin, or try making the skater glide in a figure-eight pattern around the rink.

Further Fun

Make a second skater and see if you can move the two skaters around the rink as a coordinated pair. Or have a friend make a skater, add on Popsicle® stick hockey sticks, and play a game of one-on-one hockey using a small, crumpled piece of paper as the puck.



46

Family Fridge Faces

2

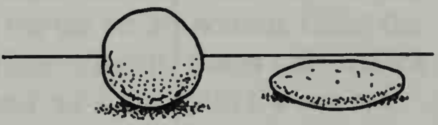
Have an important note to put on your refrigerator? Use these fun—and goofy—homemade magnets that look like the people in your family.

What You'll Need

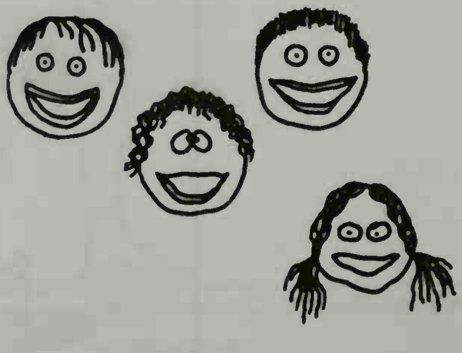
- mixing bowl
- 1/2 cup flour
- 1/4 cup salt
- 1/4 cup water
- mixing spoon
- teaspoon
- cutting board
- foil-covered cookie sheet
- garlic press
- white glue
- ten flat, round magnets, about the size of a quarter (available at hardware stores or art supply stores)
- acrylic paints and thin paintbrushes

Directions

1. In the bowl, combine the flour, salt, and water. Stir with the mixing spoon until the mixture becomes thick, then pick it up with your hands and squish it together until you have a smooth dough.
2. Scoop out 1 teaspoonful of dough and place it on the cutting board. Roll the dough into a ball, then squash it into a circle. Make six circles. Each round shape should be about ¼-inch thick and a little larger than a quarter. Place each circle onto the foil-covered cookie sheet.



3. Using the leftover dough, decorate each circle with the features of a family member. Roll tiny dough eyes and shape tiny mouths, then put them in place. To make hair, press some of the dough through the garlic press. Imitate each person's hairstyle to make the faces easier to identify.
4. Place the cookie sheet into the freezer until the faces are firm, about one hour.
5. Next, turn each face over and glue on a magnet, then turn it faceup again. Paint the faces, including the eyes, mouths, and hair. Let the magnets dry overnight, then display them on the fridge for all to see!



47

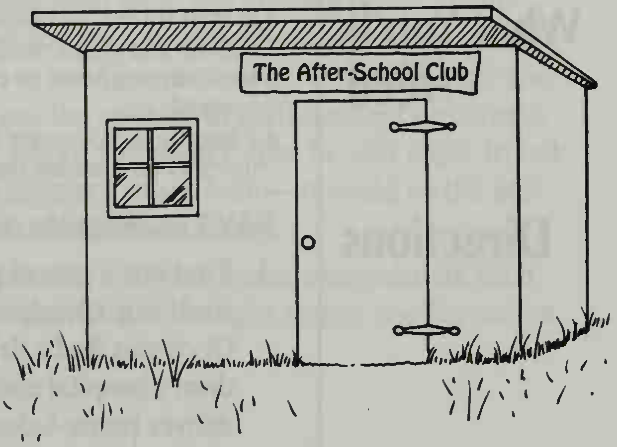
The After-School Club

1

Start a club that anyone can join and organize projects for your whole neighborhood to enjoy.

What You'll Need

- two or more friends
- meeting place



Directions

1. Think of the friends whom you'd like to have join your club. Pick the people you like to spend time with, but try not to exclude people whose feelings might be hurt if they were left out. Decide on a good place to meet. The meeting place could be one member's room, a corner of a family room, or outside in a favorite shed or under a tree.
2. Consider the talents and favorite hobbies of all the members and come up with a name that could only apply to your group of friends. Invent a unique handshake so you can greet each other in a special way when you're together as a club.
3. Write up your club's "constitution." It can include such things as your club name, the members' names, a description of the secret handshake, your club mascot, and the purpose of the club.
4. One good way to work together as a club is to have a homework/study session first thing after school. All the club members can help each other out, with members sharing their special academic talents with each other. When you're done, your club can organize neighborhood-wide games for *all* the kids to play.

48 Club Cookie Bake

3

Here's a special two-day activity for your After-School Club that's fun for you and a super way to light up someone's day.

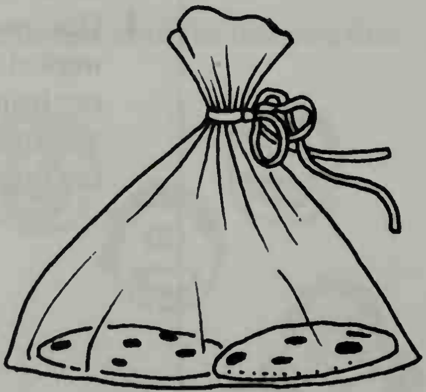
What You'll Need

- at least three club members
- address and phone number of a local nursing home or children's hospital
- a favorite cookie recipe from each member (and cookie ingredients)
- mixing bowls, wooden spoons, and cookie sheets
- box of plastic sandwich bags
- at least fifty ribbons

Directions

DAY 1 *(making the cookies)*

1. Find out if one of your parents would be willing to drive you and your friends on a special delivery errand the next day. Once you find a driver, call up a local nursing home or children's hospital and find out if it would be okay for you to deliver home-baked cookies for the residents or patients the next day. Find out how many residents there are (if there are more than fifty, you may need to find a smaller home or hospital, unless you want to bake lots of cookies). Once you've gotten an official okay, you're ready to go!
2. Multiply the number of residents or patients by two (so that you can deliver at least two cookies to each person). For example, if a nursing home has twenty-five residents, you'd need to make at least fifty cookies.
3. When you've figured out how many cookies you'll need to bake, collect recipes from your club members, and make as many varieties as you want. Gather all the ingredients at one person's house, and follow the recipes as you mix up a storm! (Remember to make a few extras for your families, too.)
4. Let the cookies cool for at least one hour, then put at least two cookies in each sandwich bag. Tie a bow around each bag. Make sure you have enough bags for each resident or patient. Store the cookies in a safe place overnight.



DAY 2 *(delivering the cookies)*

5. The next day after school, gather everyone together, put the cookies in the car, and head off to the nursing home or children's hospital. Meet the person with whom you spoke on the phone, and tell him or her that you are here to make your special delivery. Hand out the cookies to each resident or patient. Some of the people whom you meet might be very eager to talk to someone. Take a moment to say hello—it could be the best thing that happens to that person all day.
6. When you're done passing out your treats, congratulate each other on a job well done. You've brought smiles and happiness to many people!

49

Silly Signs

1

You and a friend can develop your own silent, silly language; no one else will know what you're talking about!

What You'll Need

- a friend

Directions

1. Baseball coaches tell their players on base and at bat what to do by using secret hand signals. Deaf people communicate using hand gestures called sign language. You and your friends can communicate in the same silent way by making up your own hand signals.
2. Start by thinking of a few sentences you and your friend say to each other often. Examples include:

   "Let's go over to my house."

   "I aced my test!"

   "That guy/girl is really cute!"
3. For each sentence, you'll need to come up with a silent signal equivalent. You can use any combination of hand, leg, arm, or head movements, including tapping your feet, crossing your fingers, bobbing your head, or touching your ear in a particular way. If the movements are big, people will know you're up to something. If they are small and subtle, others may not know there's something going on.
4. Practice using your signs until you and your friend can make the signs quickly and read them easily. Test each other when you are by yourselves. When you've got them memorized, try them out silently in front of others.

Further Fun

You can gradually build a whole repertoire of signs and signals. You and your friend can set a goal to learn a new signal a week, or three new signals a week—whatever you decide.

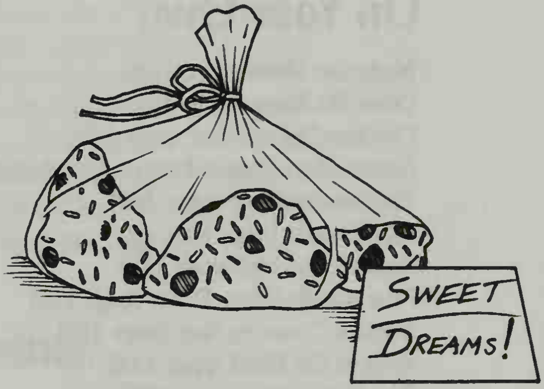
50

Munchable Moon Rocks

Munch, munch, crunch, crunch. Moon rocks look a little odd, but the taste is out of this world.

What You'll Need

- 1 cup peanut butter (chunky or smooth)
- 1½ cups marshmallow creme
- large mixing bowl
- mixing spoon
- 1 cup semisweet chocolate chips
- 1 cup crispy rice cereal
- tablespoon
- ungreased cookie sheet
- plastic sandwich bags (one for each member of your family)
- note cards
- pen


SWEET DREAMS!

Directions

1. Combine the peanut butter and marshmallow creme in the bowl. Stir with the spoon until they are thoroughly mixed.
2. Add the chocolate chips. The mixture will be fairly thick and hard to stir, so use your muscles!
3. Add the crispy rice cereal. Stir just long enough to mix in the cereal without crushing it into a fine powder.
4. Take a heaping tablespoonful of the mixture and roll it into a ball. Place the ball on the ungreased cookie sheet. Keep making balls until all the mixture is used up. Place the cookie sheet in the refrigerator and chill for at least two hours.
5. Count out one sandwich bag for each member of your family. Place two or three moon rocks in each bag. Secretly place one bag on each person's pillow with a note saying "Sweet Dreams!"

The Perfect Project for the Perfect Occasion

Choosing an activity is easy with this quick-reference list. Just select a category and find an activity that interests you. Many of the projects listed here overlap.

On Your Own

Magazine Medley (page 98)
Color Me Slimy (page 102)
Chicken Noisemaker (page 103)
School-Year Remembrance Album (page 104)
Fashionable Fido (page 106)
Rain Reader (page 108)
Robin Hood Hat (page 112)
Pine Needle Space Boots (page 114)
Ancient Treasure Map (page 115)
Bells in the Wind (page 118)
Sun Silhouettes (page 120)
Adobe Abode (page 121)
Time Capsule (page 122)
Captivating Coupons (page 123)
Radical Rocket (page 124)
A Whale of a Secret! (page 127)
Mystery Messages (page 129)
Spiro-Designs (page 130)
Name Game (page 131)
DJ for a Day (page 132)
Blooming Terrarium (page 135)
Liquid Rainbow (page 136)
Stained "Glass" Mobile (page 138)
Create a Critter (page 139)
Foam Glider Plane (page 140)
The Sunny Day Rain Stick (page 142)
Recycled Paper (page 144)
Shimmery Shoelaces (page 146)
Krazy Kountry (page 147)
Through Wizened Eyes (page 150)
A Feast for the Birds (page 151)
Magnetic Ice Rink (page 152)
Family Fridge Faces (page 154)
Munchable Moon Rocks (page 159)

GIFTS FOR SOMEONE SPECIAL

Use your free time after school to make a gift for a friend or a family member. No matter what the occasion, you can create a thoughtful present for someone you care about. These are some of the projects that can easily be turned into a cool gift:

Magazine Medley (page 98)
School-Year Remembrance Album (page 104)
Bells in the Wind (page 118)
Captivating Coupons (page 123)
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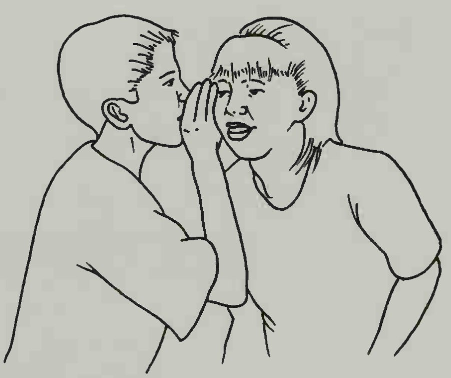

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"Tricks" of the Trade

Before you start pointing your magic wand trying to turn your little sister into a rabbit, take heed. Every activity or hobby has certain "rules" that must be followed to ensure success. Even magic has a few tips that every magician adheres to. Read them, learn them, know them—and you will be on your way to becoming a real magician!

Never reveal how a trick is done.

Never? Never! This is probably the most important rule to be remembered by anyone studying magic. A well-performed magic trick creates a sense of wonder to those who experience it. If you, the magician, explain how you did the trick, you are reducing the magic to nothing more than just a simple joke or a puzzle to your audience.

Never repeat a trick.

No matter how much they scream, "Do it again!" and no matter who is asking you to repeat a trick—don't! Whenever you repeat a trick for the same person or audience, you run the risk of the secret of your trick being discovered.

Think about it. When you fool your friends with a magic trick, why are they fooled? Because none of your friends knew what to expect. Now, if you were to do the exact same trick over again, do you think your friends would watch it again in the exact same way?

No. They have already *seen* the trick. They know what happened. Instead of looking at the trick, they will be watching you and your *every move*.

As with most rules, there are a few exceptions. First of all, there are magic tricks that depend on you repeating the same actions over and over within that trick. There are also some tricks that are so cleverly put together that you can repeat the same trick. But in this case, only repeat it once. How do you know when it is okay to repeat a trick? Usually, when you are reading how the trick works, the instructions will tell you. If the instructions don't say anything about repeating the trick, don't repeat it!

The next exception to the rule are those tricks known as "sucker tricks." These are tricks where it appears as if the magician is repeating the trick to explain how it's done. However, the magician fools the audience *again,* and the audience realizes that the magician was never really explaining how the trick was accomplished. It was all part of the trick!

The only other time repeating a trick is allowed is when you actually know two or more ways of accomplishing the same trick. This way, if your friends ask you to do the trick again, you can. Just do it a different way. This will throw your friends off, because they will notice that you are doing it a bit differently. By the time they get their thoughts together, you will have reached the end of the trick and fooled them all over again!

Practice, practice practice.

Practice is a very important element in the art of magic. Every trick you ever learn will have to be practiced until it can be done flawlessly. Some tricks will take more time to learn than others, but all magic tricks need to be practiced.

You should practice each trick in your room or somewhere private where you can be alone to study how the trick is going to look to the audience. To study your movements, practice in front of a mirror. This will allow you to see the magic trick from the audience's perspective. If you catch a glimpse of something that you are not supposed to see, chances are someone in your audience would have seen it, too.

One tool that can help you out while practicing your magic is a video camera. If you own a video camera, you have technology that some of the greatest magicians in the world never had available to them. But since you do, use it!

With an adult's help, set up your video camera and focus it on the area where you will be practicing your magic. If you move around during the trick, you may need to have someone behind the camera, following your actions. Practice every trick as if you were in front of an audience. When you are done, pop the tape into your VCR and watch yourself perform. Look for areas within the trick that need work. If you messed up somewhere along the way, you will see it on the tape and correct it the next time. Don't forget to listen to yourself talk while you watch the trick. Does your patter need work?

During parts of the trick where you did something exceptionally well, use the rewind on your VCR to study it again. The more you see it, the easier it will be for you to remember just how you accomplished it. If your VCR has a slow motion feature . . . all the better! Slow the tape down so you can study it even closer.

Regardless of what tools you use to practice with, each and every trick should be performed until you know it by heart. That way, not only will you be confident when you present the trick, but you won't have to pay that much attention to the trick itself while you are performing it and will, therefore, be able to focus more attention on your audience.

Appearance counts.

The way *you* look to your audience is just as important as the way your *tricks* look to the audience. Therefore, very close attention should be paid to your appearance.

Obviously, if you are just doing a few tricks for some friends, you don't need to put on a tuxedo. But you should give the impression that you are a competent magician and, therefore, dress the part. Make sure that your clothes are clean and free of tears or holes. The better you look, the better you will feel about yourself, and the more confident you will be.

Now, on the other hand, if you *are* presenting a formal magic show to an audience—a little more care toward your appearance is needed. For boys, a clean shirt and matching tie is appropriate. A coat or dress jacket will add to the outfit and will also supply some handy pocket space for the carrying of some props. For the girls, a nice pants suit or dress will do fine. If you are well dressed for your show, your magic will be much more appealing to the people watching it, and you will gain an early command of your audience. They will *want* to see what you have to show them. They will have confidence in you and your magic. Think about it. If you were to visit a restaurant and the waiter or waitress who brought you your food was untidy and dirty looking, would you have confidence in eating the meal?

Above all, whether presenting your magic formally or informally, make sure your hands are clean—skin *and* fingernails. The hands are the magician's most important props. They are what the audience is going to spend the most time looking at. Take good care of them and treat them well. If needed, a nongreasy hand lotion can be used. This will keep your hands soft and smooth looking.

Be original.

Make any trick you do your own. Play around with the storyline and presentation. Don't be afraid to change things around to fit your personality. If the trick doesn't seem to work that well for you the way it is written in the book, change it! As long as you are still fooling people and entertaining them at the same time, there is no harm in changing the way you do things to accomplish the trick.

Now that you have a few "tricks" of the trade under your belt, read up on 50 of the niftiest magic tricks around!

On with the show!

1

Big Squeeze

Squeeze a little glass of water so tightly that it vanishes into thin air!

What You'll Need

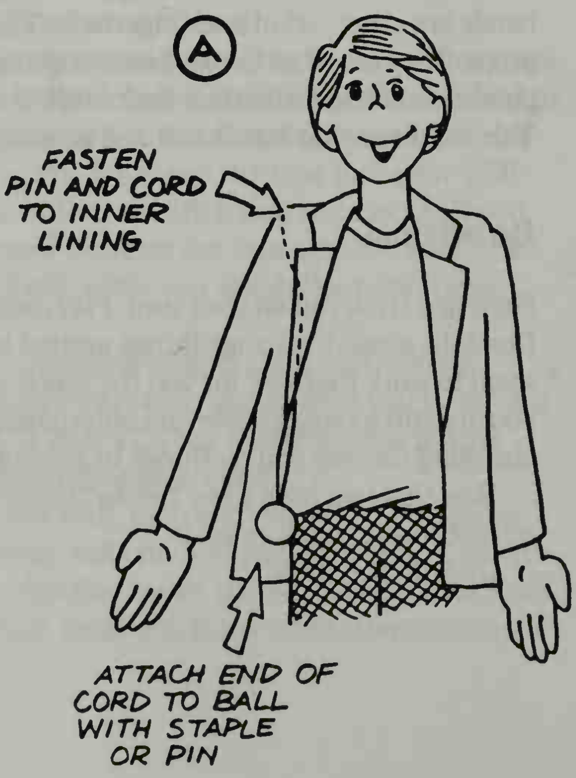
- a black elastic cord that is a little shorter than your arm
- a hard rubber ball that will fit tightly into the mouth of a shot glass
- a staple or pin
- safety pin
- small shot glass

Getting Ready

Attach one end of the cord to the ball with the staple or pin. Tie the other end of the cord to the safety pin. Fasten the safety pin with the cord tied to it to the inner lining of your magician's jacket at the top of the right shoulder (A). The cord and rubber ball should hang three inches *above* the bottom of your jacket. If the cord is too long, cut it from the top and retie it to the safety pin.

Show Time!

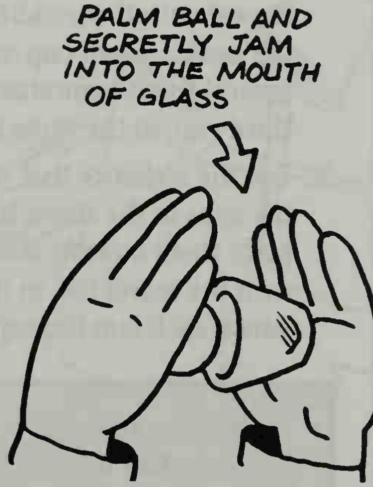
1. While standing in front of the audience, pretend you have an itch. The itch should be near your right hip. Reach into your jacket with your right hand and pretend to scratch. Take the hanging ball into your hand as you do this. As you withdraw your hand, make sure your knuckles are facing the audience and that the ball is well concealed in your palm with your last three fingers holding the ball in place. This technique is known as *palming,* and although it may feel funny, it is a very effective way to hide small objects. And, if you relax your other fingers, it makes you look like a great showman.


A
FASTEN PIN AND CORD TO INNER LINING
ATTACH END OF CORD TO BALL WITH STAPLE OR PIN

2. Pick up the glass with your left hand and point to it with your right hand (with ball still concealed). Say, "I've been practicing my powers of strength, and yesterday I squeezed a glass like this into thin air. Let's see if I can do it again."
3. Put your right hand on top of the glass and squeeze the glass between both hands with all your might. While you are squeezing, jam the secret ball into the mouth of the glass until it is tightly stuck (B), and straighten your arms out and down to stretch the elastic cord.
4. Turn slowly to your left and then suddenly throw your hands up into the air and yell, "Shazam!" The glass will be pulled into your jacket so quickly that no one will see it disappear. Your hands will be empty!

NOTE: This trick requires lots of practice. When it is performed well, you will earn everyone's respect.

(B)


PALM BALL AND SECRETLY JAM INTO THE MOUTH OF GLASS

2

Classic Cups and Balls

Learn a classic cups-and-balls trick like the one magicians perform around the world, swiftly passing cups through balls and balls through cups. You'll be amazed to learn how easy this trick really is!

What You'll Need

- 4 balls, either sponge or paper
- 3 cups

(The cups must be stackable so that they "nest" together. They must also be tapered so the balls fit between the cups when they are stacked, without being noticed. The cups must be of a solid material so no one can see through them.)

Getting Ready

Place a ball into one of the cups. Stack, or nest, the three cups, *mouths up,* on a table. The cup containing the ball goes in the middle of the stack (A). Place the remaining three balls in the top cup.

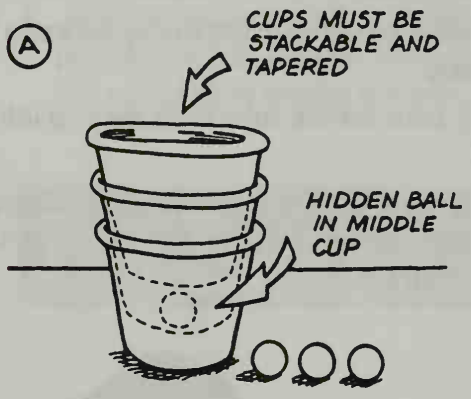
Show Time!

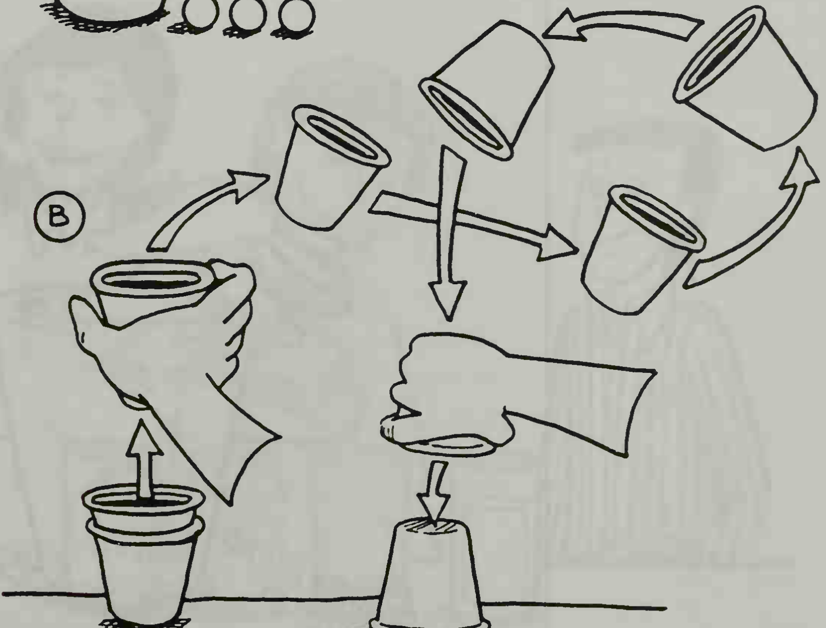
1. Pick up the cups together in one stack and spill the three balls onto the table. This lets everyone see the balls.
2. THE HARD PART: Everyone should see each empty cup but not the secret ball. Holding the stack of cups upright, take the top cup with your free hand and swoop the cup up and down through the air, then set it *mouth down* on the table (B). Repeat with the middle cup (the secret-ball cup). Place it over the upside-down cup on the table. (You should practice this several times beforehand so the ball doesn't roll out.) Place the third cup, in the same manner, upside down on the other two.
3. Tell the audience that you have no tricks up your sleeve. Pick up the cups in the stack, turning them right side up. One at a time, place them *mouths down* on the table, side by side. The cup with the secret ball in it will be in the middle. Remember to swoop each cup through the air before you put it on the table!

NOTE: Swooping your hand through the air actually helps force the ball to stay in the cup when it is upside down for a short time.

4. Pick up one of the three balls that you spilled out in Step 1 and place it on top of the middle cup. Cover it with the other cups, tap your wand on top, and say, "Hocus Pocus!" Pick up the stack with one hand. Presto! The ball on the table must have gone right through the cup!

> NOTE: This trick requires lots and lots of practice in order to achieve a flawless performance. The great thing about it is that once you've memorized the steps, you can perform it just about anywhere! Once you've become comfortable with the steps and can easily swoop and turn the cups over without spilling the balls, you can make up your own routine.


Ⓐ
CUPS MUST BE STACKABLE AND TAPERED
HIDDEN BALL IN MIDDLE CUP



MOTION OF CUP

3

Quick Freeze

You can magically turn water into ice without a freezer!

What You'll Need

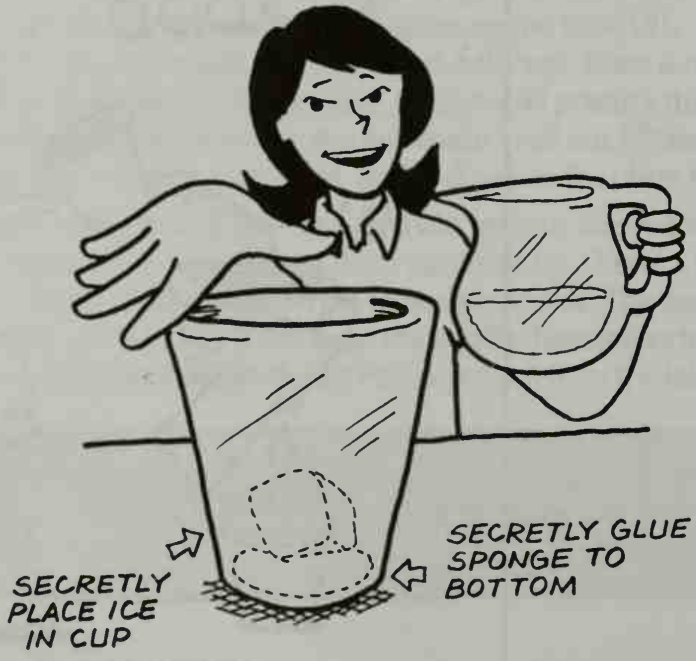
- scissors
- sponge
- paper cup
- glue
- ice cube
- water
- pitcher

Getting Ready

Cut the sponge to fit snugly into the bottom of the cup. Secure it with a little glue. Right before you perform this trick, secretly place the ice cube at the bottom of the cup.

Show Time!

1. Pour a *little* water from the pitcher into the cup and say, "This ordinary water will now magically disappear."
2. Now ask a volunteer from the audience to kindly join you on the stage.
3. Slowly pour the ice cube from the cup into the volunteer's hand.
4. Say, "I really tried to make the water *disappear*, but it was just too *hard*!" When you pour the water into the cup, the sponge soaks it all up!


SECRETLY PLACE ICE IN CUP
SECRETLY GLUE SPONGE TO BOTTOM

4

Five Glass Jive

Five glasses are lined up full, empty, full, empty, full. Ask a volunteer to change the order to three full glasses on the right, two empty glasses on the left—in one swift move, with one hand! Only you have the know-how to do it.

What You'll Need

- 5 glasses
- water

Getting Ready

Fill three of the five glasses with water. Line them up on a table in the following manner: full, empty, full, empty, full.

Show Time!

1. After several people try to change the order of the glasses, simply take the full glass on the right end and pour the water into the empty glass second from the left.

> NOTE: Your friends will probably want to throw the water on *you* after this trick, so you'd better run!

5

Tip Over Tube

With your magic tube, change a white ball to red and back to white again!

What You'll Need

For the Tip Over Tube:
- 2 small, empty vegetable cans (3¼ inches high, 2½ inches wide)
- colored adhesive tape
- black contact paper
- scissors
- glitter

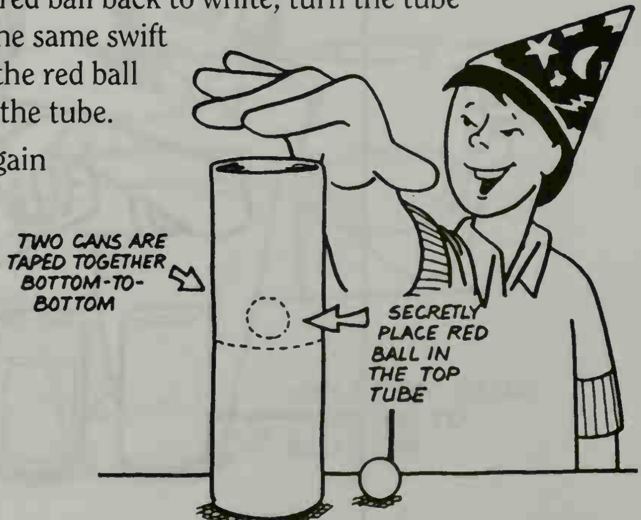
For the trick:
- the finished Tip Over Tube
- 2 rubber balls: one red, one white

Getting Ready

To make the Tip Over Tube, place cans bottom-to-bottom. Wrap tape around the middle so they stay together. Wrap black contact paper around the whole tube to completely cover the cans. Decorate the tube with colorful tape and glitter any way you like.

Show Time!

1. Stand the tube on one end and hide the red ball in the top part. Place the white ball next to the tube.
2. In front of the audience, pick up the tube slowly from the bottom. Quickly turn it over and put it down so the red ball does not fall out. Practice this several times. You'll be surprised how easy this is to do.
3. Drop the white ball into the top compartment of the tube. Your audience will expect the white ball to fall through, but when you pick up the tube, the ball underneath will be red!
4. To change the red ball back to white, turn the tube over again in the same swift way, and drop the red ball into the top of the tube.
5. Lift the tube again and show that the red ball has turned back to white!


TWO CANS ARE TAPED TOGETHER BOTTOM-TO-BOTTOM
SECRETLY PLACE RED BALL IN THE TOP TUBE

6

What Water?

This marvelous trick is perfect for a real wiseguy. It is also very easy. The magician makes water disappear with a flick of a light switch.

What You'll Need

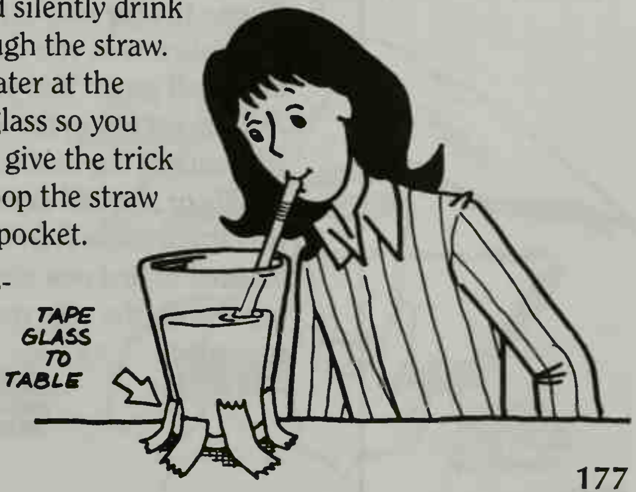
- drinking straw
- glass ¾ full of water
- colored or white adhesive tape

Getting Ready

Before performing this trick, practice drinking very quietly through the straw. Then hide the straw in your pocket.

Show Time!

1. Tape the glass of water to the table. Explain to your audience that you are going to make the water in the glass disappear without moving the glass or the tape. (Fastening the glass down is a little Houdini-like and will add some drama and suspense.)
2. Close your eyes and appear to be concentrating *very* hard. Pretend that you are trying to make the water go away with the power of your mind. Take a peek at your progress by opening one eye. When you see that nothing has happened, act really embarrassed. Ask for total darkness because you can't stand the embarrassment.
3. When your assistant turns out the lights, stomp up and down, bang your fists, and make a lot of noise. In the meantime, take out the straw. Use the noise as a distraction while you quickly and silently drink the water through the straw. Leave a little water at the bottom of the glass so you don't slurp and give the trick away. Quickly pop the straw back into your pocket.
4. Have your assistant flick the light back on while you stand there with a big grin on your face.



7

The Tissue Tease

Craftily turn three pieces of wadded-up tissue paper into one piece of tissue paper with a secret message.

What You'll Need

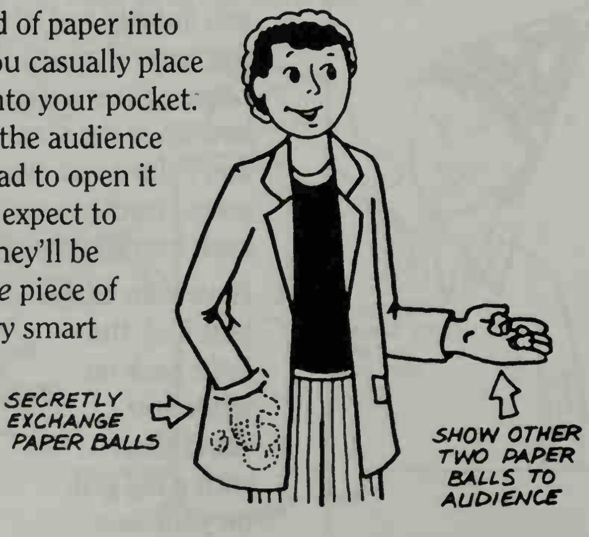
- felt pen
- 1 large piece of tissue paper and 3 small pieces of tissue paper

Getting Ready

With the felt pen, write, "Keep litter off the streets" in big letters on the large piece of tissue paper. Crumple it up into a ball and put it in your jacket pocket. Crumple up the other three pieces into balls. The audience will see these during the trick.

Show Time!

1. Place the three little paper balls on the table in front of you. Pick up two balls and put them in your left hand. Show the audience.
2. Pick up the third ball and put it in your pocket. Pull it out again as if you have changed your mind, but bring out the bigger ball at the same time, hidden in the palm of your hand.
3. Place the third ball in your left hand with the other two. Immediately put your hands together and wad all the pieces of paper together with the big one.
4. With your left hand remove the *big piece only* from the wad now in your right hand. Make the audience think you've got nothing left in your hand by palming the three small balls and moving your fingers naturally.
5. Throw the big wad of paper into the audience as you casually place the small group into your pocket. Ask the person in the audience who caught the wad to open it up. He or she will expect to find three balls. They'll be amazed to find *one* piece of paper with the very smart message!


SECRETLY EXCHANGE PAPER BALLS
SHOW OTHER TWO PAPER BALLS TO AUDIENCE

8

The Last Drop

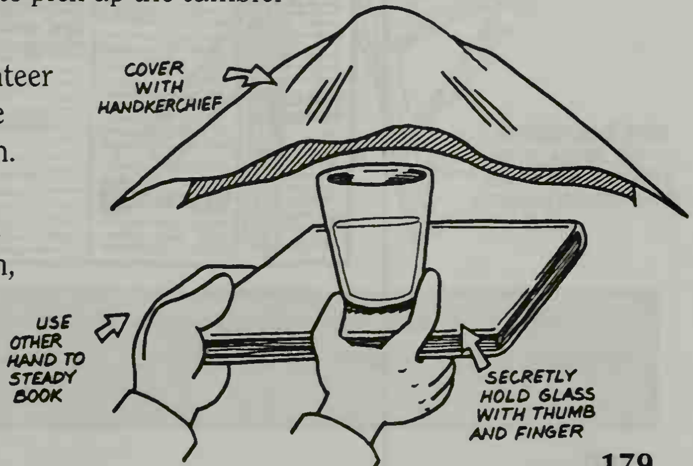
By adding one more drop of water to a glass, make it impossible for a volunteer to lift the glass from a book.

What You'll Need

- hardcover book
- empty plastic tumbler
- pitcher of water
- large handkerchief
- eyedropper

Show Time!

1. Invite a volunteer onstage.
2. Hold the book in your right hand with your thumb on top of the book and your fingers below the book. Place the plastic tumbler on top of it. Pour the water from the pitcher into the tumbler until it is half full.
3. Cover the book and tumbler with the handkerchief. Ask the volunteer to pick up the tumbler from the top through the handkerchief. Ask him or her to set the tumbler down again. Remove the handkerchief and add one drop of water to the tumbler using the eyedropper.
4. Cover the book and the tumbler again with the handkerchief. Quickly shift your fingers under the handkerchief so that your thumb and pointer are above the book and holding tight to the bottom of the tumbler. The rest of your fingers are under the book. Steady the book with your other hand if you need to, but let the volunteer see that hand *above* the handkerchief. As you shift your fingers with a quick move, explain that you forgot to say the magic words, "Hocus Pocus," which will make it impossible for him to pick up the tumbler this time.
5. Ask the volunteer to pick up the tumbler again. Because you are holding it by the bottom, he won't be able to move it at all!


COVER WITH HANDKERCHIEF
USE OTHER HAND TO STEADY BOOK
SECRETLY HOLD GLASS WITH THUMB AND FINGER

9

Super Paper

Turn an ordinary sheet of newspaper comics into a bouncing ball.

What You'll Need

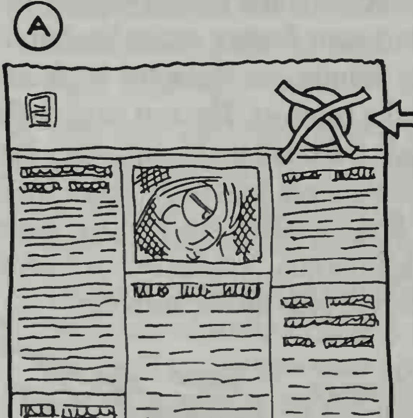
- double-sided adhesive tape
- hard rubber ball
- single sheet of newspaper comics

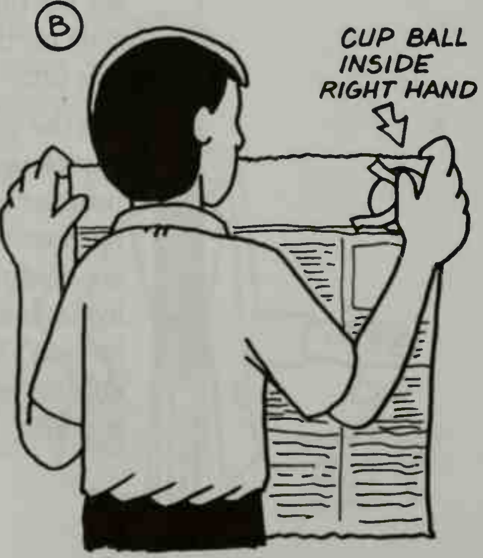
Getting Ready

Tape the ball to the top right-hand corner of the comics page in a crisscross fashion (A).

Show Time!

1. Hold the paper in front of you by its upper corners with the ball facing you and cupped inside your right hand (B).
2. Say, "Believe it or not, I'm going to turn this funny page into a funny bouncing ball." Tightly crumple the paper around the rubber ball, then show the audience your great paper ball.
3. Chances are your audience won't be too impressed. That is, until you bounce it, and it comes right back up to your hand!


A
SECRETLY TAPE BALL TO TOP RIGHT-HAND CORNER


B
CUP BALL INSIDE RIGHT HAND

10 Zap Ball

With ease and grace, you can make a rubber ball vanish into thin air!

What You'll Need

- pants with belt loops
- small rubber ball
- 12 inches of black elastic cord
- tack

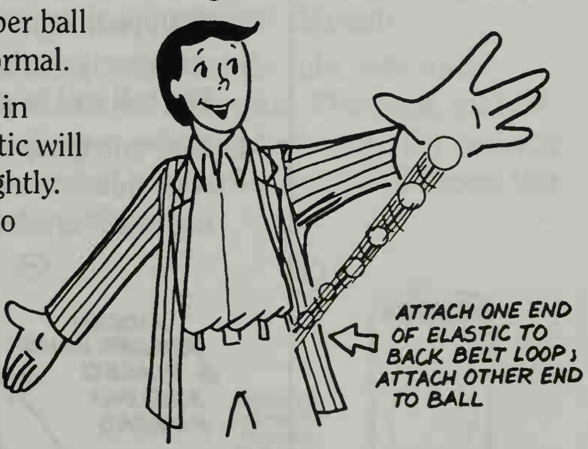
Getting Ready

In this trick, belt loops on pants serve as a quick springlike device to make a rubber ball look as if it has vanished into thin air. To set up the trick, attach one end of the elastic cord to your middle back belt loop. String the cord through all the loops on your left side except for any that might show when your magician's coat is not buttoned.

Next, attach the rubber ball to the other end of the cord with the tack. The elastic needs to be as long as the distance between the back belt loop and the first completely hidden belt loop. That first loop stops the ball from swinging away from you and keeps the ball within your reach, too.

Show Time!

1. Take the rubber ball in your left hand and stand so your left side faces the audience. Let them see the ball but not where it came from—pretend to have taken it out of your pants pocket. Because your left arm will be blocking the elastic from the audience's sight, the rubber ball will look perfectly normal.
2. With the rubber ball in front of you, the elastic will be stretched fairly tightly. Let go quickly, and no one will see the ball escape inside your jacket.


ATTACH ONE END OF ELASTIC TO BACK BELT LOOP; ATTACH OTHER END TO BALL

NOTE: This trick happens so quickly, it is more effective to perform it in silence. It does, however, require lots of practice to be pulled off effectively.

11

Ball Gone

With the flourish of a silk handkerchief, you can make a rubber ball disappear!

What You'll Need

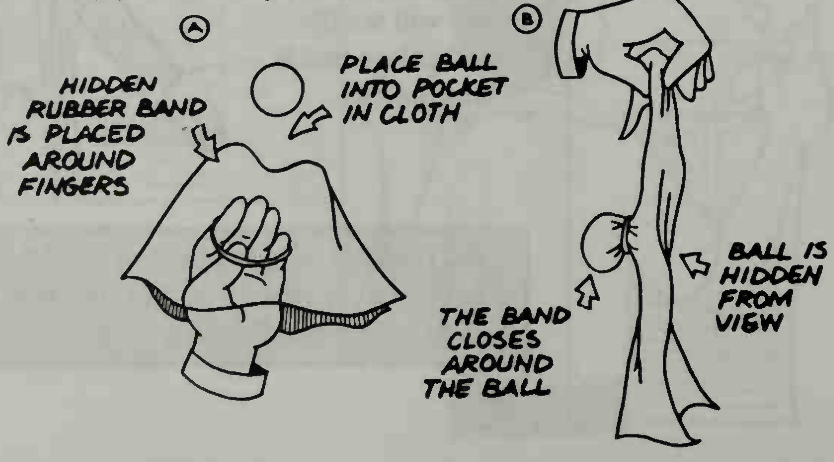
- small rubber band
- multicolored silk handkerchief
- small rubber ball

Getting Ready

Secretly place the rubber band around the tips of your fingers on your left hand. Lay the handkerchief over your left hand, fingers pointing up (A). This won't be easy to do during a performance. You can either go offstage and come out again with the handkerchief draped across your hand, or, with practice, you can hide your hands below the tabletop so your audience can't see you put on the rubber band. Place the handkerchief over your hand as you stand up straight again.

Show Time!

1. Poke one of your right fingers down into the center of the rubber band to form a pocket in the handkerchief. The audience will not be able to see the rubber band.
2. Place the ball into the pocket (A) and close your left fist and your right fist around it and the handkerchief. Say, "This little ball will now disappear before your very eyes."
3. With your right hand, grasp one corner of the handkerchief and give it a quick shake, while letting go with your left hand. The ball will be gone!
4. After you grasp and shake the handkerchief, hold it down at your side so the audience will not notice the "secret compartment (B)" created by the rubber band.


Ⓐ
HIDDEN RUBBER BAND IS PLACED AROUND FINGERS
PLACE BALL INTO POCKET IN CLOTH
Ⓑ
BALL IS HIDDEN FROM VIEW
THE BAND CLOSES AROUND THE BALL

12

The Ball Tube

A ball is dropped into a long tube. At your command, the ball stops and starts again until it finally drops through the other end.

What You'll Need

- cardboard mailing tube
- black tempera paint
- paintbrush
- long sturdy needle
- black thread
- small black bead
- glitter
- ball that fits snugly in the tube but rolls through easily
- glue
- ruler

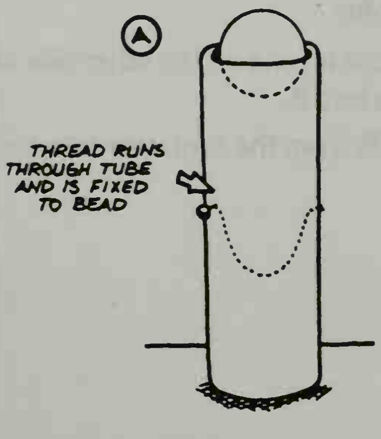
Getting Ready

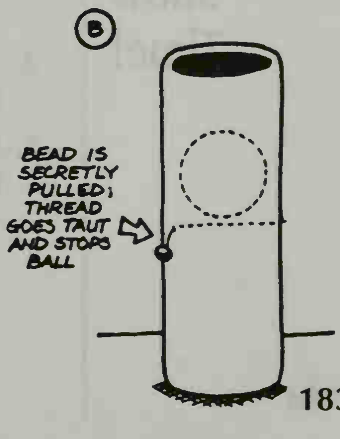
Paint the mailing tube solid black and let it dry completely. Use the needle to poke a hole in the tube about 7 inches from the end. Poke another hole directly across from the first hole. Thread the needle and push it into one hole and out the other hole. Tie a knot at the end of the thread to stop it from going all the way through.

String the bead onto the thread. Tie the bead to the outside end of the thread so that when the bead is touching the tube, the thread inside the tube is loose (about twice the width of the tube) (A). When the bead is pulled away from the tube, the thread should be pulled tight across the inside of the tube. Decorate the tube with different colors of glitter in any pattern you like.

Show Time!

1. Hold the tube straight up and down so that the bead is hidden under your thumb. With the bead in position next to the tube, drop the ball into the tube. It will fall right through.
2. Secretly pull the bead along the side of the tube with your thumb and drop the ball into the tube again. This time, the ball will seem to be magically suspended inside the tube (B). Secretly let go of the bead, and the ball will tumble out again! Repeat this trick a few times for added effect.


Ⓐ
THREAD RUNS THROUGH TUBE AND IS FIXED TO BEAD


Ⓑ
BEAD IS SECRETLY PULLED; THREAD GOES TAUT AND STOPS BALL

13

Strawberry Milk

This is a famous trick performed by many magicians including the Amazing Randi. Here are the steps and directions to make it especially easy. In this amazing trick, the audience will see you turn plain milk into strawberry milk with only a piece of fabric!

What You'll Need

- construction paper, any color
- 2 glasses
- clear adhesive tape
- piece of white cloth
- piece of cloth with red strawberries on it (bought at fabric store)
- container of milk
- eye dropper
- red food coloring
- stirring wand

Getting Ready

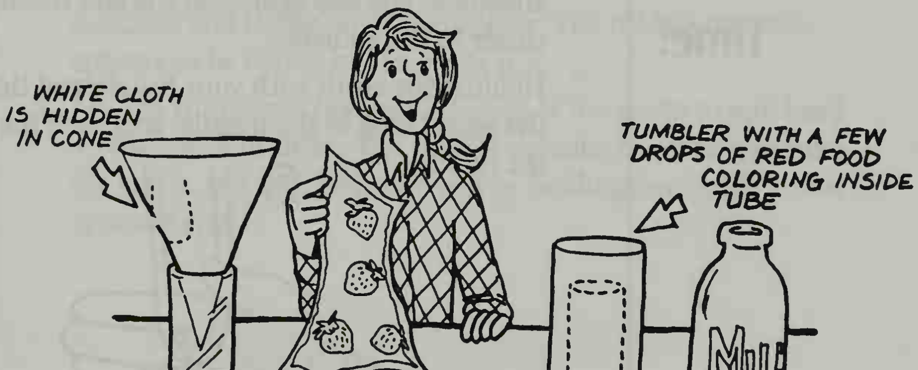
Roll up a sheet of construction paper to make a tube large enough to conceal one of the glasses. Fasten it with tape. Next, make a cone with another sheet of paper. The pointed end should fit inside the other glass. Before fastening the cone with tape, make a secret pocket with a square of construction paper of the same color. Tape three sides down, leaving the fourth open. Then roll up the cone with the pocket on the inside and fasten the cone together with the tape.

Next, fold the white cloth and slide it into the secret pocket in the cone. To prepare the table, set the cone, one empty glass, and the piece of strawberry cloth on one side of the table. On the other side, set the tube, the container of milk, and the other glass. Put three to four drops of the red food coloring into this glass. No one will see them.

Show Time!

1. Place the pointed end of the cone into the empty glass on one side of the table.
2. Stand the tube on end on the other side of the table. Put the second glass into it.
3. Pour the milk from the container into the glass that is in the tube.

4. Hold the strawberry cloth up to the audience for inspection. Carefully fold it up as flat as possible and slide it into the secret pocket of the cone alongside the piece of white cloth. (Practice this before the performance until you can do it smoothly without looking like you are setting anything up.)
5. With the wand, pretend to stir the cloth around in the cone. Next, stir the milk in the glass inside the tube.
6. Tell the audience that the strawberries have been magically removed from the cloth and transferred to the milk.
7. Lift the *plain* cloth out of the cone and show it to the audience.
8. Lift the tube to reveal the glass of pink milk! "Boy, I love strawberry milk," you say. Take a sip!


WHITE CLOTH IS HIDDEN IN CONE
TUMBLER WITH A FEW DROPS OF RED FOOD COLORING INSIDE TUBE
MILK

14

Breakthrough!

A volunteer magically escapes after being tied up!

What You'll Need

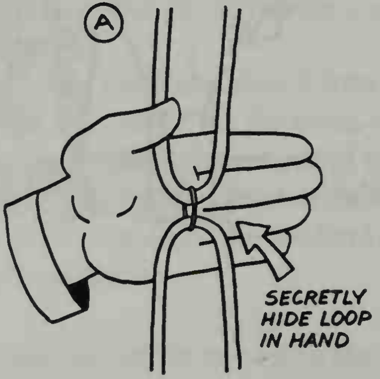
- 2 5-foot pieces of non-elastic cord or light-to-medium rope
- 5-inch piece of thread
- 3 volunteers

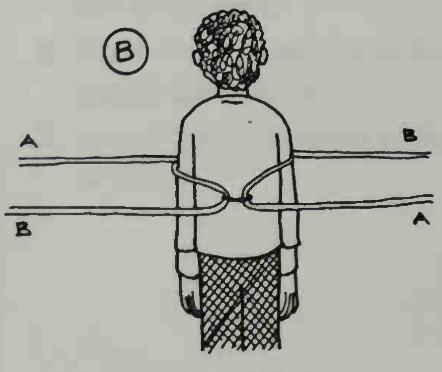
Getting Ready

To make this trick work, both cords are folded in half. The thread is used to tie a loop around the two folded ends. The loop is covered, and the illusion of two long, single cords is created. In this trick, you need only a fist to cover the secret loop (A).

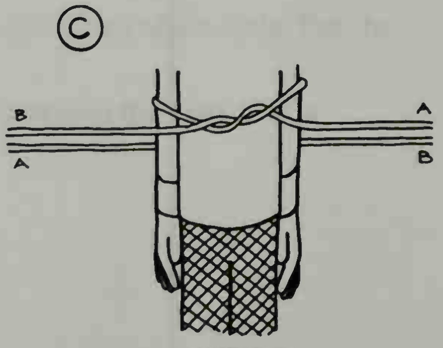
Show Time!

1. Have three volunteers stand side by side onstage, facing the audience. The two people on the end should stand forward, closer to the audience.
2. Holding the cords with your fist clasped tightly around the secret loop in the middle, approach the volunteer in the middle.


A
SECRETLY HIDE LOOP IN HAND



VIEW FROM BACK



WHAT THE AUDIENCE SEES

3. Stand in front of that volunteer with your back to the audience. Bring the cords over the volunteer's head and place them against his or her back. The secret loop should be in the center of the volunteer's back.
4. Ask the volunteer to hold the cords loosely with both hands at each side.
5. Give the left ends of the cords to the volunteer on the left and the right ends to the volunteer on the right. The result should look as though the outer volunteers are holding two long cords and the middle volunteer is standing in front of the cords (B).
6. Take one end from each of the outer volunteers.
7. Tie the ends loosely around the front of the middle volunteer's waist.
8. Step 7 will have switched the ends of the cords. Give each switched end to the outer volunteers. The middle one now appears to be bound by the cords (C).
9. Ask the volunteers holding the ends of the cords to pull hard on the count of three. The middle volunteer will be free from the cords, and the other two will be holding two cords by the opposite ends!

15

Ribbons Around Us

Pull yards and yards of ribbon from an empty hat!

What You'll Need

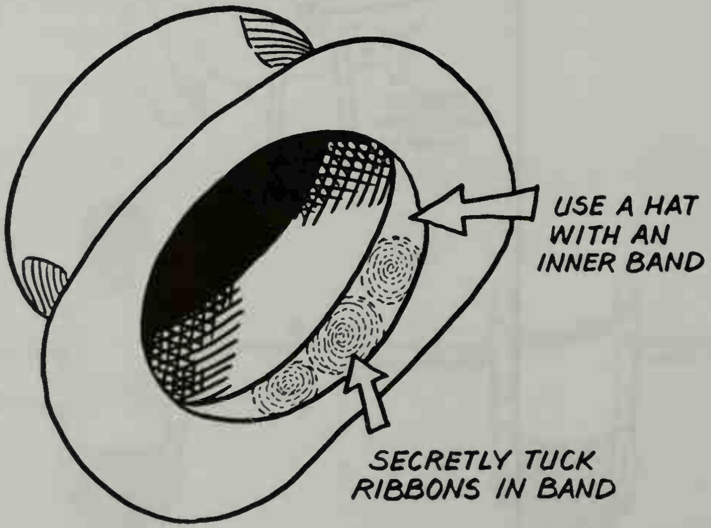
- 2 to 3 tightly wound colored paper ribbon rolls
- hat with an inner band

Getting Ready

Before the magic show begins, tuck all the rolls of ribbon under the band inside the hat.

Show Time!

1. Pick up the hat from the table. Put it on and spin it around, then take it off and show the audience both the inside and the outside. The band should hold the ribbons securely.
2. After everyone is convinced the hat is empty, set it forcefully upside down on the table. The ribbon rolls should drop into the bottom of the hat.
3. Reach into the hat and grab the ends of the rolls. Hold your other hand over the top of the hat and pull the ribbons up through your fingers from your supposedly empty hat!


USE A HAT WITH AN INNER BAND
SECRETLY TUCK RIBBONS IN BAND

16 Lions and Tigers

A member of the audience will see lions and tigers with the mention of just two magic words!

What You'll Need

- paper
- pencil

Show Time!

1. Ask a volunteer to stand up in the audience.
2. Tell him that you know two magic words that will make him see lions and tigers. Ask him to close his eyes.
3. While the volunteer's eyes are closed, write the words *lions* and *tigers* on the piece of paper.
4. Tell him to open his eyes. Ask, "What do you see?"
5. The volunteer will have no choice but to say, "Lions and tigers!"

17

Balloon Magic

Pop a balloon and watch it magically change colors!

What You'll Need

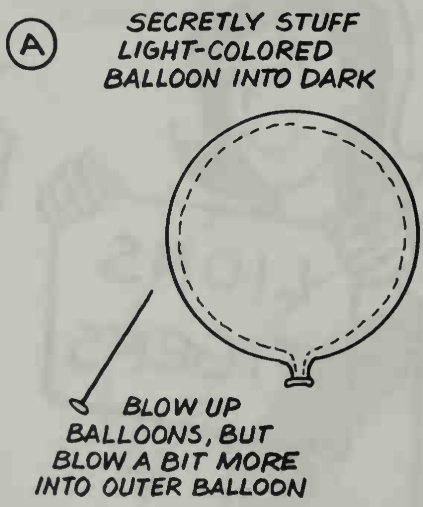
- light-colored balloon and dark-colored balloon (do not inflate them)
- straight pin

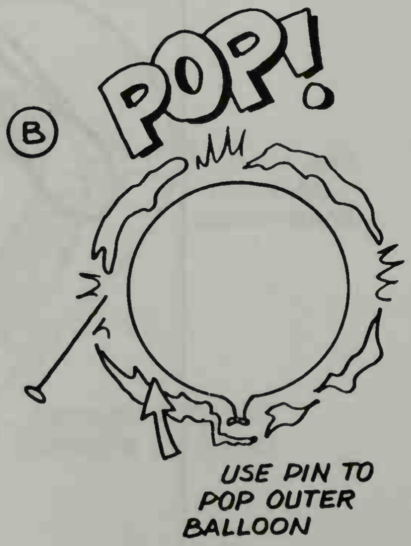
Getting Ready

Before your show, stuff the light-colored balloon into the dark one, making sure the mouths of the balloons stay together. Tuck the pin into the sleeve of your jacket.

Show Time!

1. Blow up the two balloons together.
2. Hold the mouth of the inner balloon closed and breathe a little more air into the outer balloon. Pinch both openings tight (A).
3. Hold the balloon up for the audience to see.
4. Casually remove the pin from your sleeve. Pass your hand over the balloon a few times. Pop the outer balloon (B). It will automatically "change" to a light color!


A
SECRETLY STUFF LIGHT-COLORED BALLOON INTO DARK
BLOW UP BALLOONS, BUT BLOW A BIT MORE INTO OUTER BALLOON


B
POP!
USE PIN TO POP OUTER BALLOON

18

Flea Circus

You have trained your pet flea to perform for a live audience!

What You'll Need

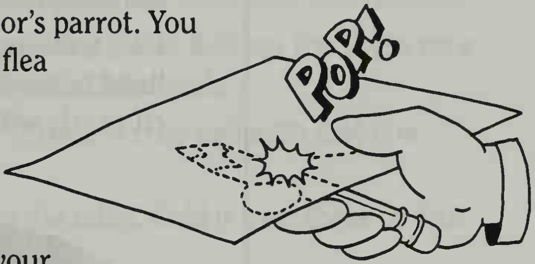
- blank sheet of paper
- wooden pencil
- small box with lid

Getting Ready

Preparing for this trick requires a little bit of practice. Hold the paper in your hand with the pencil underneath it. Practice pressing the paper hard against the pencil with your thumb. Slightly moving the paper forward with your thumb will create a small *pop*. Before you go onstage, put the little box in your pocket.

Show Time!

1. Tell a story about your remarkable flea named Fleaberta. The story can be told however you like, but these are the basic elements: Fleaberta is an invisible flea who used to perform with gypsy fleas on pets in France. She traveled here on the back of a sailor's parrot. You found her in front of the flea market performing stunning acrobatic tricks.
2. "Fleaberta will now perform," you say. With your empty hand, reach into your pocket for the box.
3. Put the box on the table and open it. Say, "Fleaberta, would you join us, please?" Pretend Fleaberta has jumped into your hand by following her with your eyes.
4. Hold Fleaberta out to your side in the palm of your hand. Hold the paper out at your other side to create a surface.
5. Toss Fleaberta into the air over your head. Follow her with your eyes until she reaches the paper. Pop the paper with the pencil when you think Fleaberta has had long enough to flip and land on the paper.



Ask Fleaberta to perform many complex and funny stunts. It's all in how you move your eyes! Make sure Fleaberta receives a nice round of applause.

19

Termite Damage

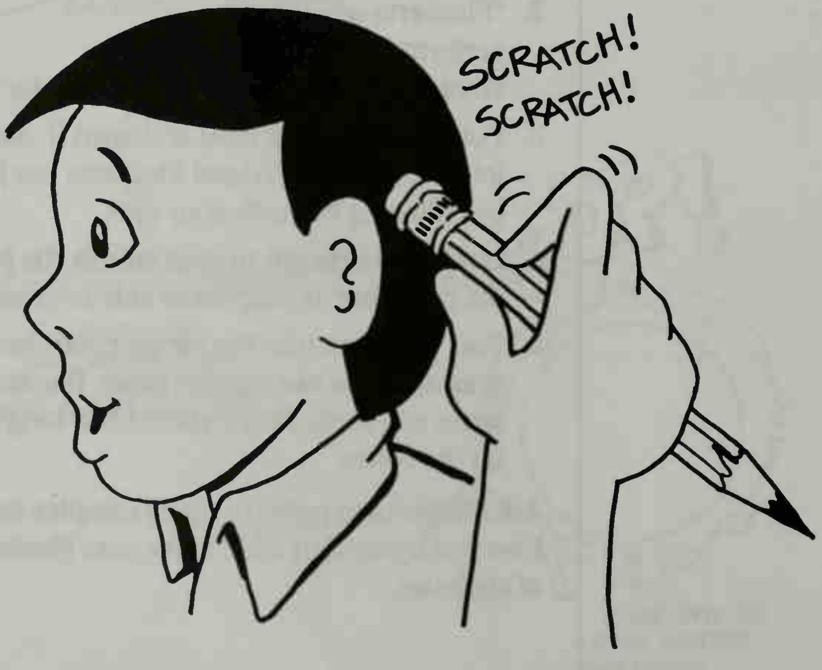
Another bugged trick! Discover termites in your pencil. Let everyone hear them!

What You'll Need

- wooden pencil
- paper

Show Time!

1. Take the pencil from your pocket and get ready to write on the paper.
2. Stop suddenly and hold the pencil to your ear as if you've heard something.
3. Exclaim, "Gee! I thought I had those termites exterminated!"
4. Everyone will look at you as if you're crazy, but try to convince them that there are termites in your pencil. "They *were* exterminated, but now they're back."
5. Pick a volunteer and hold the pencil up to his ear. With your hand next to his ear but away from his vision, scratch the pencil gently with your fingernail. The person *will* hear termites!


SCRATCH!
SCRATCH!

20

Napkin Action

In this trick of wit and smarts, you can impress your audience with your strength as you pick up a whole bucket of rocks with just a paper napkin!

What You'll Need

- several paper napkins
- small bucket with handle
- enough small- and medium-sized rocks to fill the bucket

Getting Ready

Test different napkins before performing this trick. Find one that is weak when open and strong when twisted up. Then, fill the bucket with rocks. Set it on the table just before you perform this trick. Unfold all the napkins and pile them up next to the bucket.

Show Time!

1. Ask your audience, "How many of these rocks in the bucket do you think you can lift 12 inches off the table with one napkin?"
2. Let a few volunteers try to do this. Most will put the rocks on a napkin and the napkin will definitely break.
3. Say, "I'll bet I can lift all the rocks in the pail with just one napkin!"
4. Lay an unfolded napkin on the table. Fold it over three or four times to make a thick strip.
5. Twist the strip. The napkin is suddenly much stronger!
6. Slide the napkin under the handle of the bucket and lift.

21

Spooky Shenanigans

In this trick, spooks seem to toss a wide array of objects over a shield made by a handkerchief that you hold with *both* hands.

What You'll Need

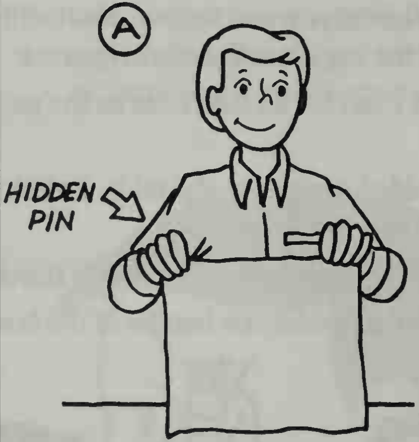
- straight pin
- large handkerchief
- small bell
- deck of cards
- ruler
- set of keys
- pencil

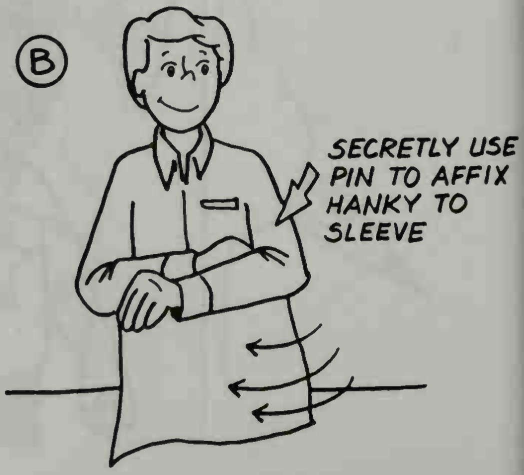
Getting Ready

Attach the pin to one corner of the handkerchief. Set all the items, except the handkerchief, on the table in front of you. Place the handkerchief in a bundle next to the pile of objects.

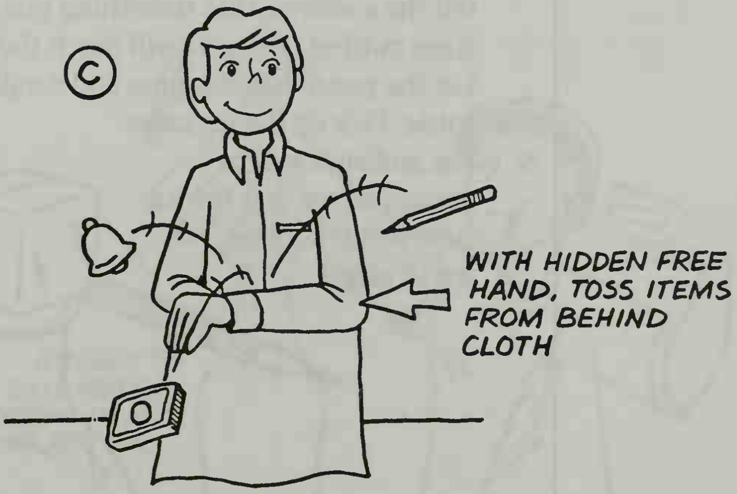
Show Time!

1. Show the various items on the table to the audience.
2. Pick up the handkerchief. Hold the corner with the pin in your right hand and the adjacent corner with your left hand. Keep the pin hidden in your fingertips (A).




B
SECRETLY USE PIN TO AFFIX HANKY TO SLEEVE

3. Holding the handkerchief as described in Step 2, revolve your arms so your right hand moves in toward your left armpit and your left hand moves out toward your right shoulder (B).
4. Lower the handkerchief's bottom edge to the table so that it conceals all the objects behind it.
5. Secretly pull the pin from the corner of the handkerchief with your right hand (this takes practice!) and attach the pin and the corner of the handkerchief to your left sleeve close to your armpit.
6. Tell the audience something really spooky is going to happen ("Now for the *really* spooky part!").
7. Your right hand is now free to move around because the corner of the handkerchief is secretly pinned to your jacket! Toss the items from behind the cloth, over the top, toward the audience (C). They'll howl with delight!
8. To end the trick, simply remove the pin from your sleeve and revolve your arms back to their original position. The spooks are gone!


C
WITH HIDDEN FREE HAND, TOSS ITEMS FROM BEHIND CLOTH

22

Ice Slice

Cut a piece of ice in two, but see it remain in one single piece!

What You'll Need

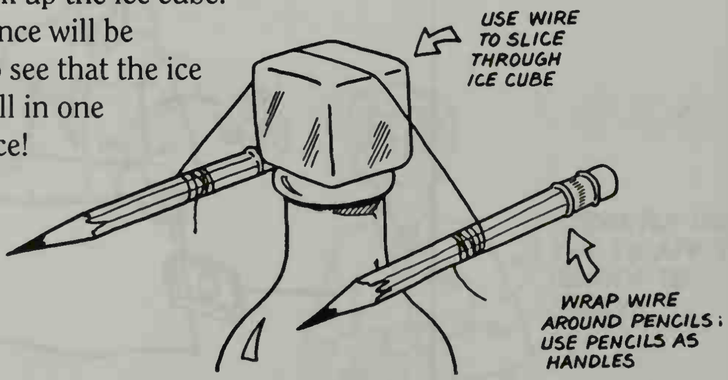
- ice cube (kept in the freezer until you are ready to use it)
- 2 pencils
- piece of thin, strong wire 9 to 12 inches long
- empty glass bottle, such as a soft drink or ketchup bottle

Getting Ready

To make a tool to slice your ice cube, take a pencil and wrap one end of the wire around the middle several times. Take the other pencil and do the same thing with the other end of the wire. The wire will slice the ice, and the pencils will serve as grips or handles.

Show Time!

1. Take the ice cube from the freezer and place it on top of the empty bottle. Place the wire over the top of the ice cube so that it will slice through the middle of the cube.
2. Slowly, pull the wire down through the ice cube by firmly holding the pencil handles. It should take three to seven minutes to cut through the ice. Have your assistant hold on to the bottom of the bottle to help steady it. In the meantime, tell a joke or build the suspense by being quiet. A drum roll is effective!
3. Once the wire is close to cutting all the way through the ice, tell the audience that something incredible is about to happen. Keep cutting. The wire will touch the top of the glass bottle. Let the pencil handles drop and dangle from either side of the bottle. Pick up the ice cube. The audience will be amazed to see that the ice cube is still in one *uncut* piece!


USE WIRE TO SLICE THROUGH ICE CUBE
WRAP WIRE AROUND PENCILS; USE PENCILS AS HANDLES

NOTE: The trick is to allow enough time to let the ice *refreeze* after the wire has cut through it. Don't become impatient and cut too fast!

23

Magic Bottle

Watch a bottle dangle from a rope too thin to hold it!

What You'll Need

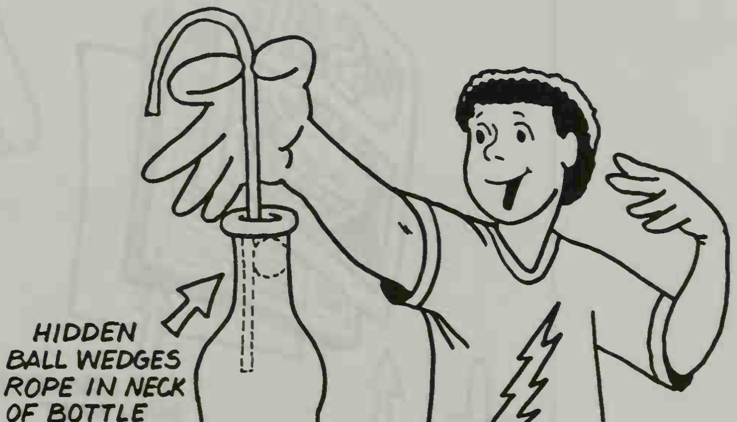
- opaque paint
- paintbrush
- glass bottle
- small rubber ball
- 1 to 2 feet of thin cord or rope

Getting Ready

Paint the bottle to make it totally opaque. Find a ball that, when placed side by side with the rope, will equal the diameter of the neck of the bottle. Slip the ball into the bottle before you perform this trick.

Show Time!

1. Hold the bottle in one hand in front of the audience.
2. At the same time, hold the rope in your other hand.
3. Lower the rope into the bottle, slowly turning the bottle upside down. The ball will fall into the neck of the bottle and wedge against the rope.
4. Pull the rope out toward you just slightly. This will tighten the wedge inside.
5. Take the free end of the rope and hold it up. The bottle will magically hang from the rope without falling!


HIDDEN BALL WEDGES ROPE IN NECK OF BOTTLE

24

Mind Reader

Learn how to be a mind reader in this deceptive magic trick!

What You'll Need

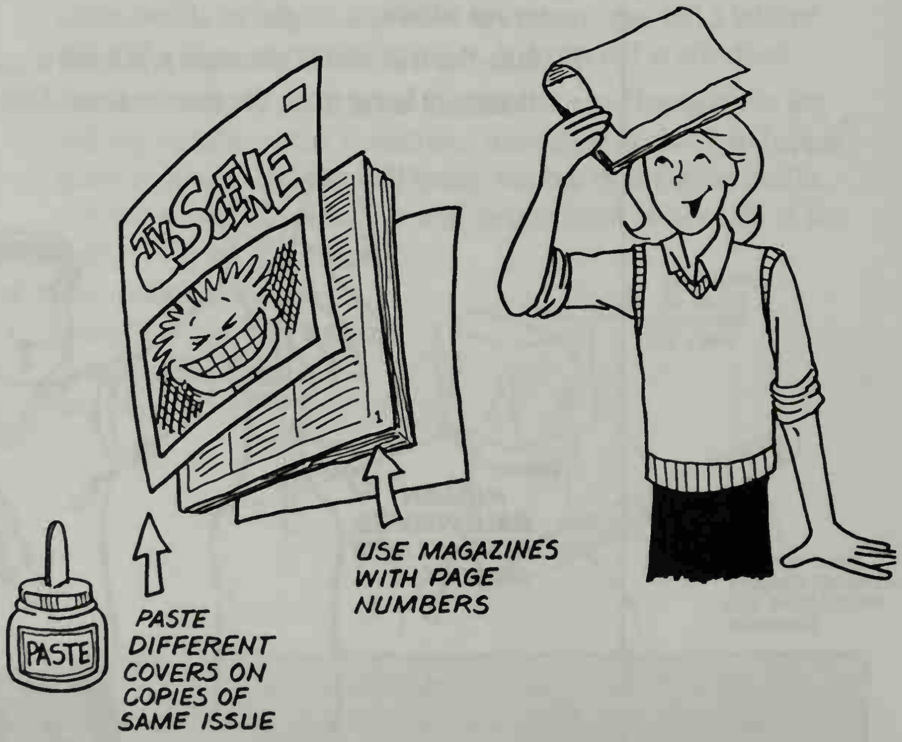
- 5 to 6 different issues of the same magazine
- scissors
- 5 to 6 copies of *one* issue of the *same* magazine
- paste

Getting Ready

Before you perform this trick, find a magazine with page numbers. Cut off the front and back covers from all the different issues. Carefully paste the different covers onto the copies of the same issue. Place the "glued" magazines on the table in a pile when you are ready to perform the trick.

Show Time!

1. Invite a volunteer to pick up any of the magazines lying on the table.
2. Ask her to look at the last page number in that particular issue. Have her choose a number between one and the last page number and tell you that number.


In Scene
1
PASTE
PASTE DIFFERENT COVERS ON COPIES OF SAME ISSUE
USE MAGAZINES WITH PAGE NUMBERS

3. Pick up another magazine from the pile as if you are going to demonstrate to the volunteer what you want her to do. Make sure she sees only the cover of your magazine so she'll think it's indeed a different issue than the one she picked.
4. Ask her to turn to the page number she selected. Remind her what it is. Say, "Please concentrate very hard as you look at that page. Hold it to your head." Demonstrate how it should be done by opening the magazine to the page that was picked and glancing over it quickly, remembering photos and headlines.
5. As your volunteer holds the magazine to her head, pretend to be able to read her mind.
6. She'll be awfully surprised when you're able to give brief details of the page that she picked!

25

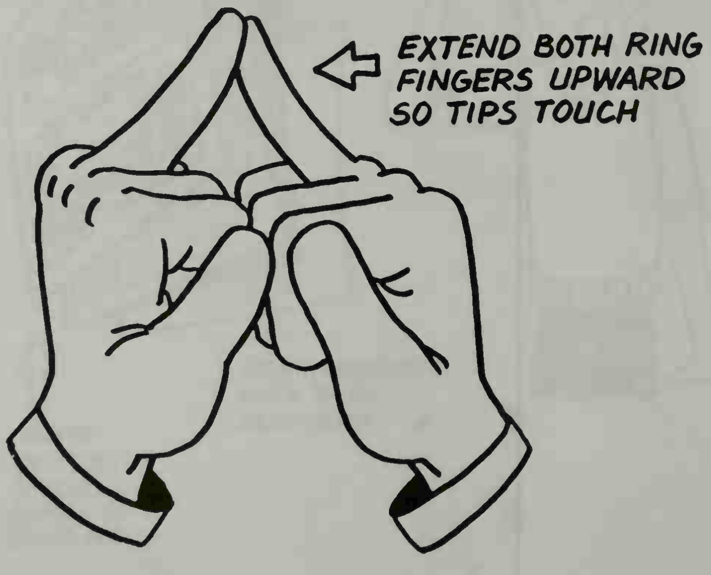
Finger Frustration

With the mere wave of a wand, freeze an unsuspecting volunteer's fingers together! This is a great beginner's magic trick and most people love to be included in it. It is a great crowd gatherer. Try this one on your friends at school!

Show Time!

1. Ask a friend to volunteer. "It's for an experiment!" you say.
2. Tell your friend to make fists and put them together, palms down, knuckle to knuckle.
3. Ask her to extend both ring fingers upward so their tips touch. The knuckles should still be touching. This is not an easy move for most. It may take awhile.
4. Wave your hands or magic wand over your friend's hands. Say, "You now have been drained of all power from your ring fingers." (You can laugh devilishly for added effect.)
5. What you see next is hilarious. Nothing happens! It is impossible to move the two fingers apart!

> NOTE: This trick is even funnier if you have several volunteers at one time—try your whole classroom!


EXTEND BOTH RING FINGERS UPWARD SO TIPS TOUCH

26

Some Enchanted Salt Shaker

Lift a salt shaker magically into the air without using your fingertips!

What You'll Need

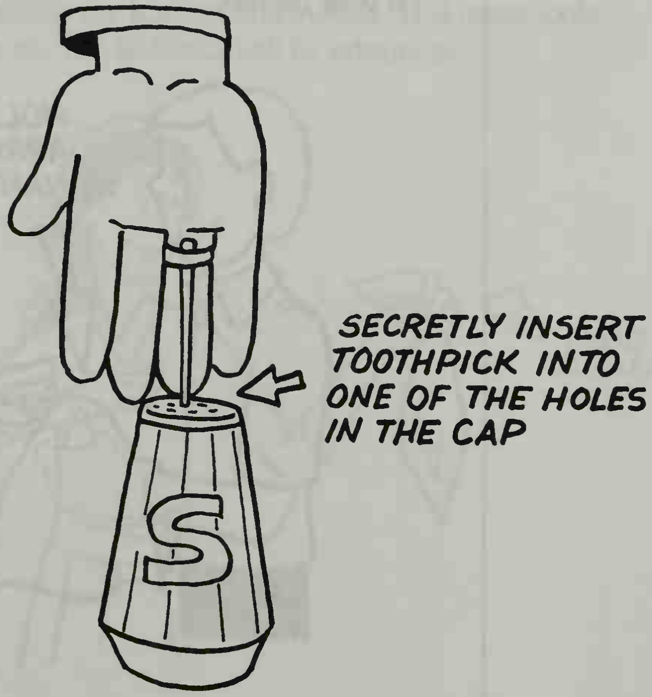
- ring for your ring finger
- toothpick
- salt shaker

Getting Ready

Put the ring on. Hide the toothpick by tucking the end of it under the ring on the inside of your finger. Place the salt shaker on the table.

Show Time!

1. Slowly lower your hand, palm down, over the salt shaker on the table. Insert the secret toothpick firmly into one of the holes in the cap.
2. The back of your hand will be facing the audience to conceal the toothpick. Your fingertips should point down toward the table.
3. Pretend to levitate the salt shaker with your fingertips. The toothpick will stay in the shaker hole if it is jammed in tightly. This will mesmerize your audience!


SECRETLY INSERT TOOTHPICK INTO ONE OF THE HOLES IN THE CAP
S

27

My Thumb, Please!

In this beginner's magic trick, create a real shiver when you ask someone to hold something for you.

What You'll Need

- carrot
- knife
- handkerchief

Getting Ready

Find a carrot with a tip that is about the size of your thumb. Carefully cut a length of the carrot that matches the length of your thumb and hide it in your fist.

Show Time!

1. Cover your fist with the handkerchief.
2. Poke the carrot up so it looks like your thumb under the handkerchief.
3. Ask someone to please hold your thumb through the handkerchief.
4. Once he has a good grasp of it, simply walk away with your thumb tucked into your palm. He's left holding what he thinks is your thumb!

28

Slip Knot

This amazing trick is easy but makes you look like a genius!

What You'll Need

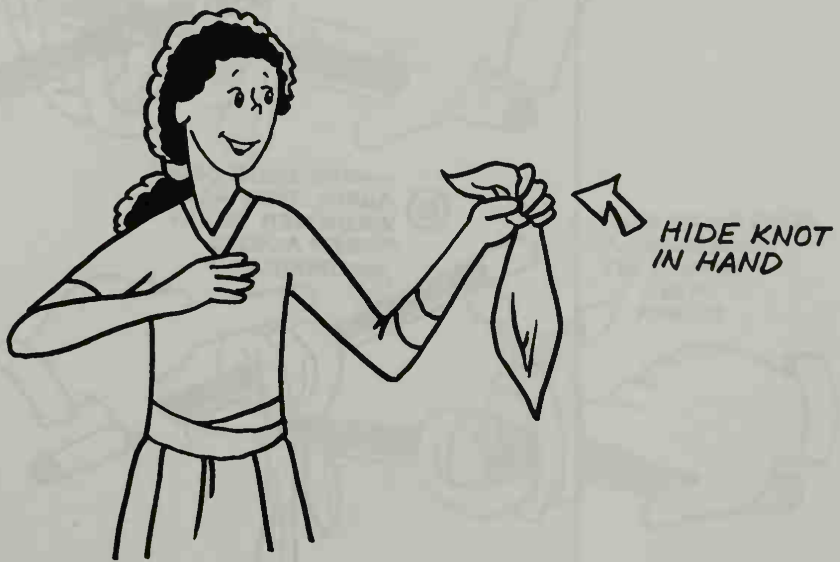
- 1 silky handkerchief

Getting Ready

Before the magic show begins, tie a tight knot in one corner of the handkerchief.

Show Time!

1. Hold the handkerchief by its knotted corner, hiding the knot in your thumb and fingers.
2. Point to the lower end of the handkerchief, saying that you can shake the handkerchief so hard, its free corner will knot back up on itself.
3. Bring the free corner up to your fingertips and the hidden corner. Shake the free end back down again.
4. Repeat Step 3 three or four times.
5. The last time you do this, shake the handkerchief extra hard, and release the knotted end instead. This move fools everyone. The audience will be astounded.



29

Not a Knot

This amazing little knot trick will keep your friends guessing for a long time!

What You'll Need

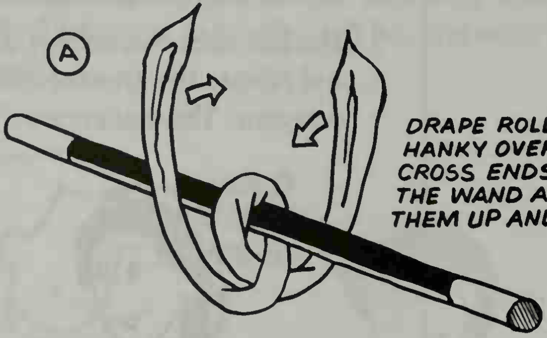
- magic wand
- handkerchief

Getting Ready

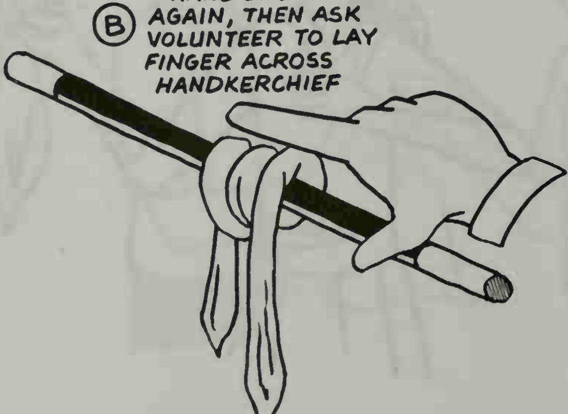
A magic wand can easily be made from the cardboard tube that is found on most hangers that come from the dry cleaner. Paint the tube black. Make white tips at both ends with white tape or construction paper. Glue thumbtacks to the ends to give your wand "tap-ability." Sprinkle on a little glitter or give it a nice shiny coat of varnish.

Show Time!

1. Ask a volunteer to help you undo a "double-twisting-sidewinding knot."
2. Have her hold one end of the wand and point the other at you while keeping it level.

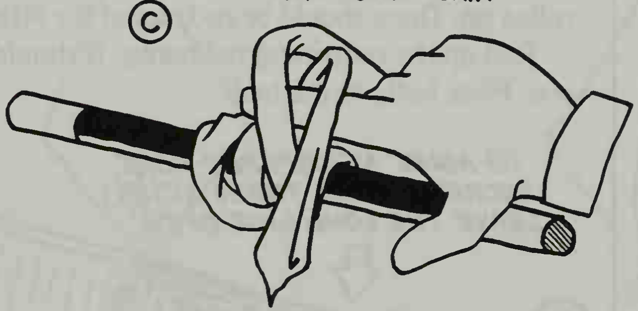


DRAPE ROLLED-UP HANKY OVER WAND; CROSS ENDS UNDER THE WAND AND BRING THEM UP AND OVER--

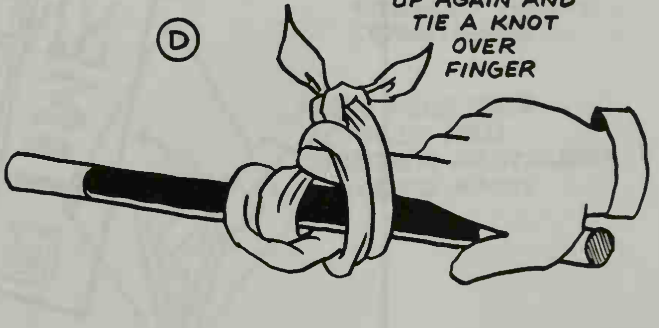


--HANG ENDS DOWN AGAIN, THEN ASK VOLUNTEER TO LAY FINGER ACROSS HANDKERCHIEF

3. Take the handkerchief by one corner and roll it up tightly.
4. Drape the rolled handkerchief over the wand so both ends hang evenly.
5. Cross the ends underneath the wand, and bring them up and over the wand, so the ends hang down again (A).
6. Ask your volunteer to please lay her finger along the wand over the handkerchief (B).
7. Repeat Step 5, but this time in the opposite direction. Bring the ends up and over your volunteer's finger, across, and down again (C), then up again so you can tie a knot over her finger (D).
8. Say, "By the time my helper moves her finger, this knot will have magically dissolved."
9. Hold the knot on top of the volunteer's finger and the loose end of your wand as well.
10. Ask her to pull her finger away quickly. Presto! No knot!



GOING IN THE OPPOSITE DIRECTION, BRING ENDS UP OVER FINGER, CROSS, AND THEN DOWN AGAIN--



--THEN BRING ENDS UP AGAIN AND TIE A KNOT OVER FINGER

30

Presto Hanky

In this complex trick, you will make a colorful handkerchief not only jump from one location to another but reappear tied between two other handkerchiefs!

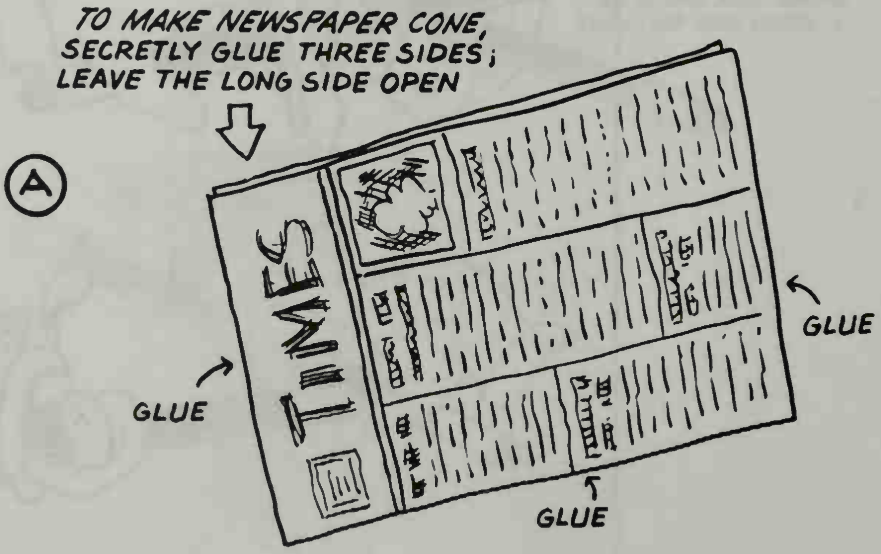
What You'll Need

- glue
- 2 single sheets of newspaper
- whole newspaper
- 2 large red handkerchiefs
- 2 identical multicolored handkerchiefs or scarves with red borders
- empty goblet

Getting Ready

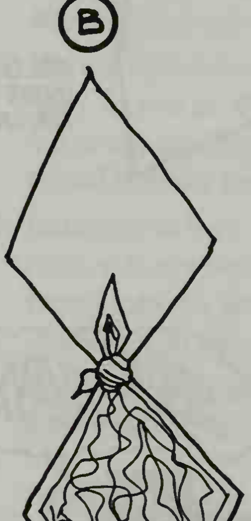
Make a secret envelope by gluing three sides of the single sheets of newspaper together. Leave a long side open (A). Place your newspaper "envelope" into the whole newspaper so it fits in normally, and keep it handy for the performance. To prepare the handkerchief, follow these directions and look carefully at the illustrations. First, take one corner of a red handkerchief and tie it to a corner of a multicolored handkerchief (B). Pick them up by the knot. Next, lay the two handkerchiefs on a table, with the multicolored hanky on top. Now, roll up the multicolored hanky lengthwise (C). Fold the roll back over itself so only the red border protrudes beyond the knot (D). Finally, roll up the red handkerchief around the folded part (E). The final result should look like one red hanky rolled up. There should be no trace of the other one.

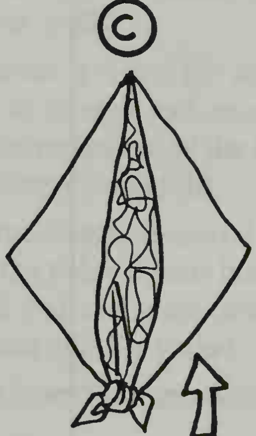
Roll up the remaining red hanky. It should look like the other one. Place both on the table.


TO MAKE NEWSPAPER CONE, SECRETLY GLUE THREE SIDES; LEAVE THE LONG SIDE OPEN
A
TIMES
GLUE
GLUE
GLUE

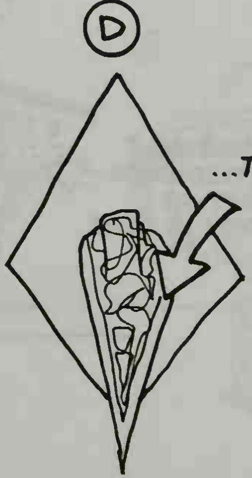
Show Time!

1. Hold the "magic" hanky in one hand with your thumb and forefinger around the knot. Hold the other red hanky in your other hand about one inch from the top corner. The two hankies should look exactly the same.
2. Tie the top corners of the hankies together. (The multicolored one should still be hidden inside.)
3. Wad the "two" hankies together, and stuff them into the empty goblet (F).
4. Next, you need to make a paper cone. Naturally, you reach into your handy newspaper and pull out the ordinary-looking single sheet of newspaper that you previously turned into a secret envelope.
5. Roll this sheet into a cone and hang on to it with one hand.
6. Take the remaining multicolored handkerchief, fold it in quarters neatly with your free hand, and pretend to slip it into the cone, but actually slip it into the big pocket you created.



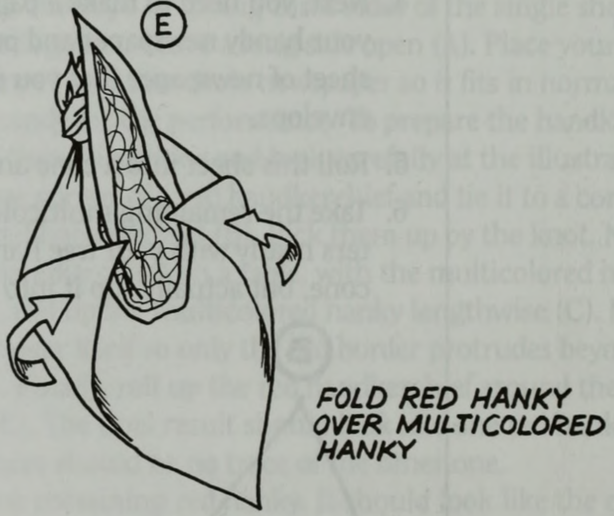


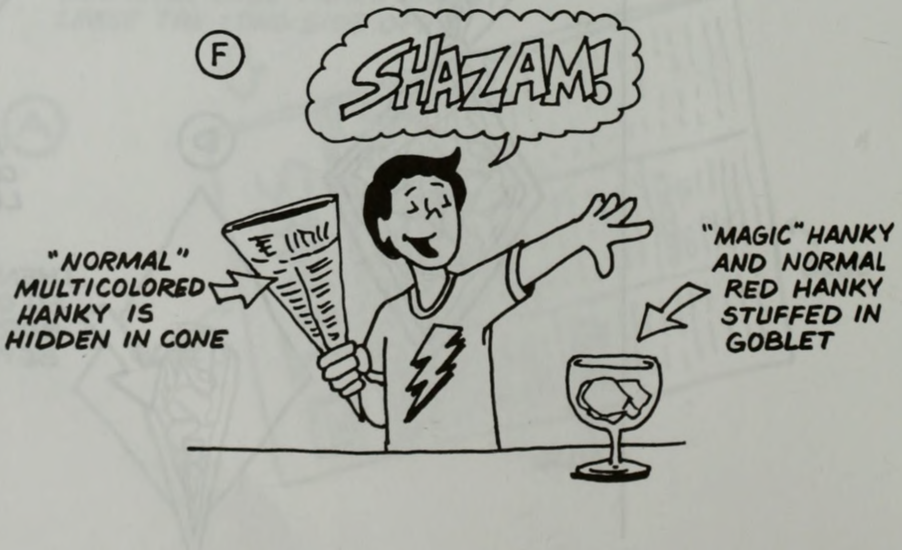
ROLL UP MULTI-COLORED HANKY LENGTHWISE...



...THEN FOLD OVER SO ONLY RED BORDER PROTRUDES BEYOND KNOT

7. Tell the audience that with the magic word *Shazam!* you will make the hanky in the cone join the red hankies in the goblet.
8. Reach into the goblet and quickly pull out one free corner of the hankies. The multicolored one will amazingly be tied between the red hankies!
9. Unroll the newspaper cone and show both sides of it. There will be no trace of the other multicolored handkerchief!


E
FOLD RED HANKY OVER MULTICOLORED HANKY


F
SHAZAM!
"NORMAL" MULTICOLORED HANKY IS HIDDEN IN CONE
"MAGIC" HANKY AND NORMAL RED HANKY STUFFED IN GOBLET

31

The Ching-Chang Basket

With the mystical ching-chang basket, turn paper confetti into silk handkerchiefs!

What You'll Need

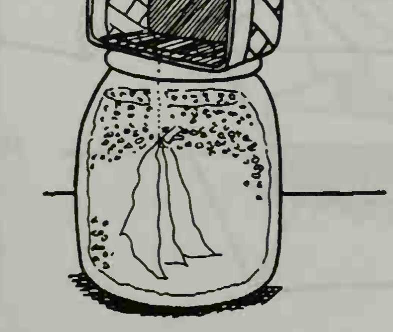
- large glass jar
- brightly colored paper confetti
- black thread
- scissors
- shallow basket
- 4 or 5 silky handkerchiefs

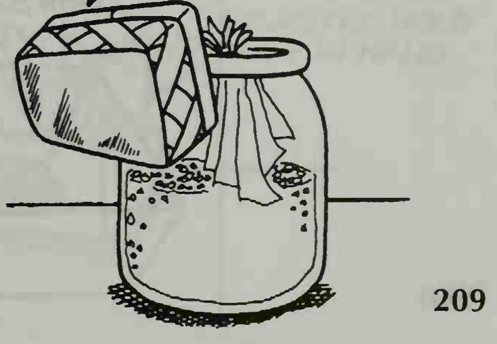
Getting Ready

Fill the glass jar ¾ full with confetti. Tie one end of the thread to the edge of the basket. Cut the thread so that it is ¾ the diameter of the basket opening. Next, bundle up the handkerchiefs and tie the other end of the thread around them. Hide the bundle of handkerchiefs in the confetti in the jar. Set the basket right side up on top of the jar.

Show Time!

1. Pick up the basket in both hands and hold its open side toward the audience. The black thread will hang into the jar from the *bottom* edge of the basket. The audience will see just an empty basket with a jar of confetti underneath it (A).
2. Tip the basket forward, until its underside is facing the audience. As you do this, lower the basket so its edge just covers the top of the jar. The handkerchiefs will be pulled out of the jar and tipped into the basket without the audience seeing (B).
3. Continue to turn the basket in the same direction until it is right side up. Now hold the basket in the palm of your hand. Reach into the jar with your free hand. Pull out some confetti and toss it in the air so it sprinkles down into the basket.
4. Pull out the handkerchiefs one by one from the supposedly empty basket!




Ⓑ
TIP BASKET FORWARD; HANKIES WILL BE PULLED OUT OF JAR AND INTO BASKET

32

The Turning Box

The magical turning box is a source of great bewilderment to an unsuspecting audience. In this trick you will show your audience an empty box, both inside and out. Then, with a couple of turns, you will mysteriously pull out six handkerchiefs!

What You'll Need

- scissors
- rectangular tissue box
- contact paper
- paper-towel tube
- adhesive tape
- 6 large silky handkerchiefs

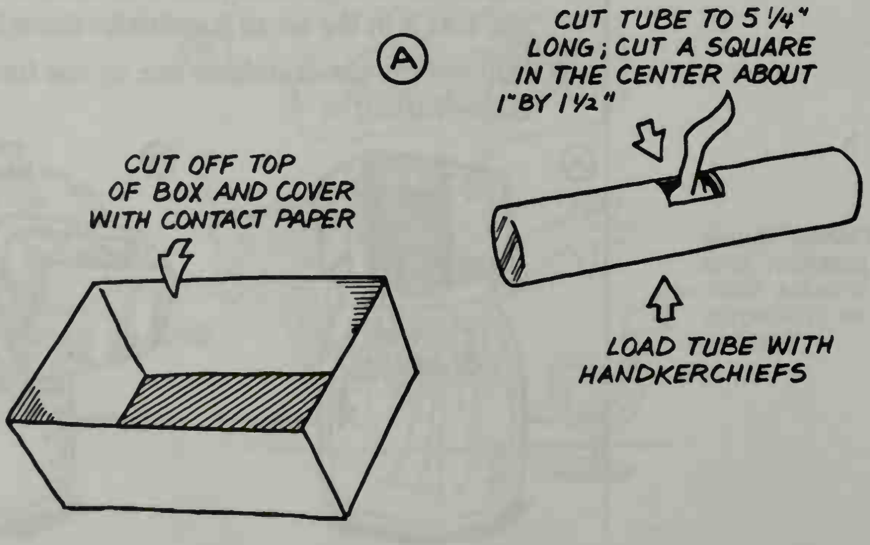
Getting Ready

To make the box, cut off the top of the tissue box. Cover it completely, both inside and out, with the contact paper (A). To assemble the device that makes this trick a success, cut the paper-towel tube down to 5¼ inches long. Cover it completely with the same contact paper. Carefully cut a square in the middle of the tube about 1 inch by 1½ inches. Seal the ends of the tube with adhesive tape. Cover the tape with contact paper and neatly trim the edges.

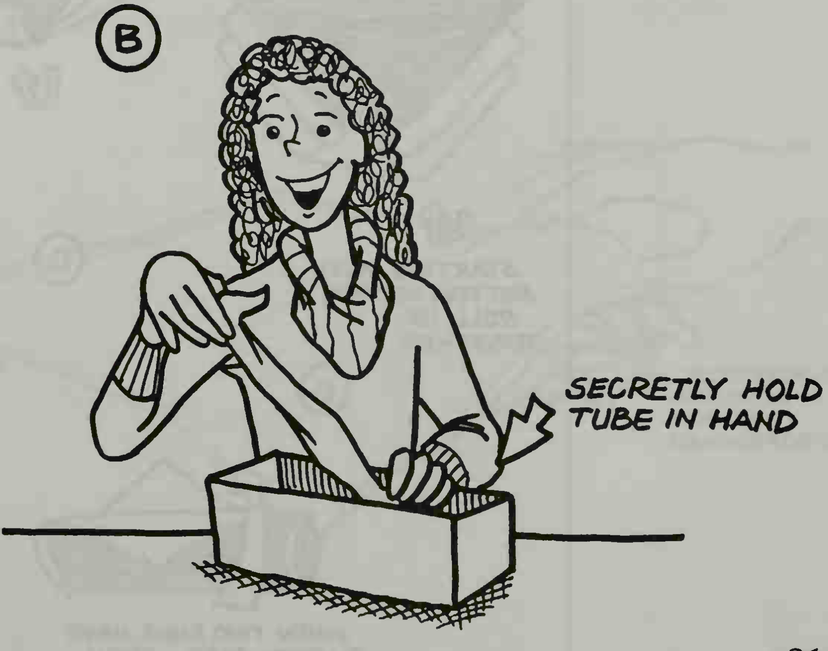
Next, tie the ends of the handkerchiefs together and put them into the tube one by one through the square opening (A). Put the tube inside the tissue box.

Show Time!

1. Hold the box between your hands, mouth up, and tube inside.
2. Gently set the box on the table.
3. Tilt the box toward you with your left hand without lifting the box from the table. The mouth of the box should begin to face you, while the bottom faces the audience.


A
CUT TUBE TO 5 1/4" LONG; CUT A SQUARE IN THE CENTER ABOUT 1" BY 1 1/2"
CUT OFF TOP OF BOX AND COVER WITH CONTACT PAPER
LOAD TUBE WITH HANDKERCHIEFS

4. Tip it a little more. The tube should roll out right in front of you. Block it with your left thumb so it doesn't roll too far. Meanwhile, tap the bottom of the box with your right hand to show that there is nothing hidden. This move draws the audience's attention away from your other hand.
5. Tip the box back to its original position. The tube is now *outside* the box, hidden behind it.
6. Tilt the box toward the audience to show its inside. The best way to do this is to slide the front bottom edge back toward yourself so you don't reveal the tube.
7. Keep turning the box in the same direction until the opening is facing you again.
8. Roll the tube back in the box with your left thumb.
9. Lift the box and place it in your right palm.
10. Reach in with your left hand, and use your fingers to hold the tube against the back side of the box.
11. Holding the box this way in your *left* hand now, reach in with your right hand and pull out the six handkerchiefs one at a time (B)!


B
SECRETLY HOLD TUBE IN HAND

33

Out of Order

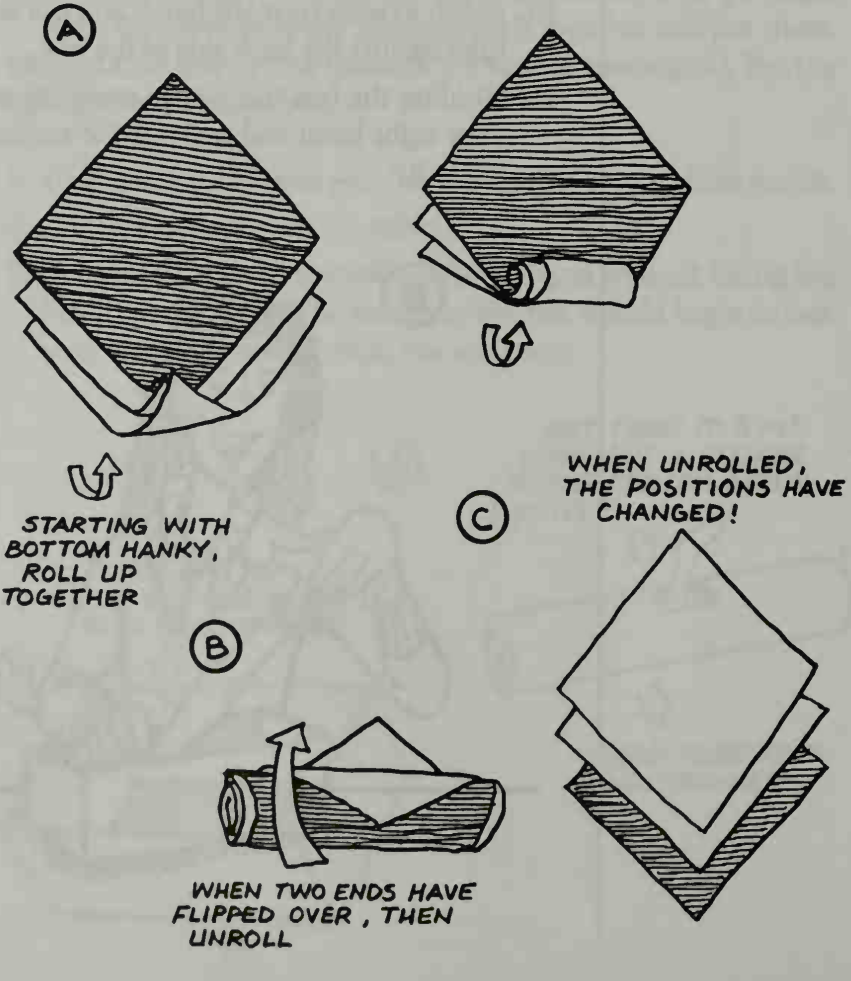
Roll up three hankies in a special order. Unroll them and they will be lined up differently!

What You'll Need

- 3 different-colored handkerchiefs or cloth napkins

Show Time!

1. Place the hankies on a table, one on top of the other.
2. Roll them up together, starting with the hanky at the bottom of the stack (A).
3. Once two ends have flipped over as you roll them up, unroll the hankies (B). Their positions have magically changed (C)!
4. Roll them up again the same way, let *one* end flip over, and the positions will change again!


A
STARTING WITH BOTTOM HANKY, ROLL UP TOGETHER
B
WHEN TWO ENDS HAVE FLIPPED OVER , THEN UNROLL
C
WHEN UNROLLED, THE POSITIONS HAVE CHANGED!

34

Disappearing Card

Here's a quick handkerchief trick to dazzle your friends!

What You'll Need

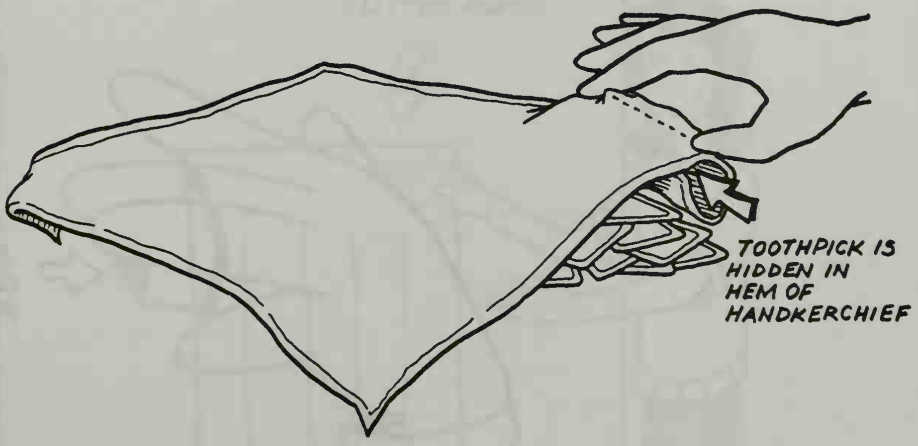
- scissors
- toothpick
- deck of cards
- handkerchief with a hem

Getting Ready

Cut the toothpick to make it the same length as the *width* of a playing card. Poke it into the hem of the handkerchief.

Show Time!

1. Spread out the deck of cards on the table.
2. Lay the handkerchief on top of the cards so that the edge with the toothpick in it is casually folded *underneath* the handkerchief.
3. Pick up the toothpick through the handkerchief with one hand. Hold one end between your thumb and forefinger. This will look as though you have picked up one of the cards!
4. Toss the handkerchief into the air and say, "Presto!" The card completely vanishes!


TOOTHPICK IS HIDDEN IN HEM OF HANDKERCHIEF

35

Good News!

Spread some fun and good news with this sneaky newspaper trick!

What You'll Need

- scissors
- empty sliding drawer box (matchbox style)
- 4 small silky handkerchiefs (red, yellow, green, blue)
- rubber band
- single sheet of newspaper

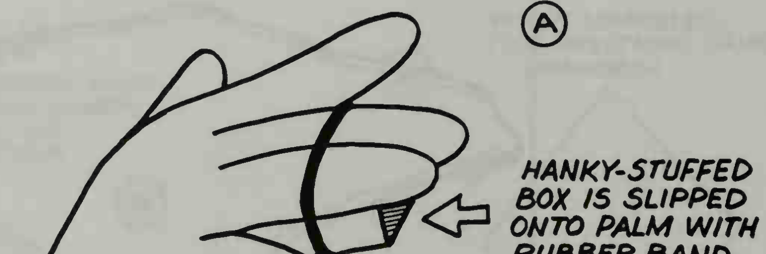
Getting Ready

First, cut one end off the drawer part of the box. Slide the cover back into place. Stuff the four handkerchiefs into the box through its new opening. Now place the rubber band around the width of the box. To prepare the newspaper for this trick, cut four slits in the sheet in different places. They should be just big enough for a handkerchief to be pulled through them.

Before you perform the trick, place the box under the newspaper on a table.

Show Time!

1. Begin by talking about the news. Using your left arm to gesture with and draw the audience's attention, slide your right hand under the newspaper, palm down, on top of the box.
2. While you continue talking about the news, slide the middle fingers of your right hand between the rubber band and the box. The opening of the box should point toward your fingertips (A).


A
HANKY-STUFFED BOX IS SLIPPED ONTO PALM WITH RUBBER BAND

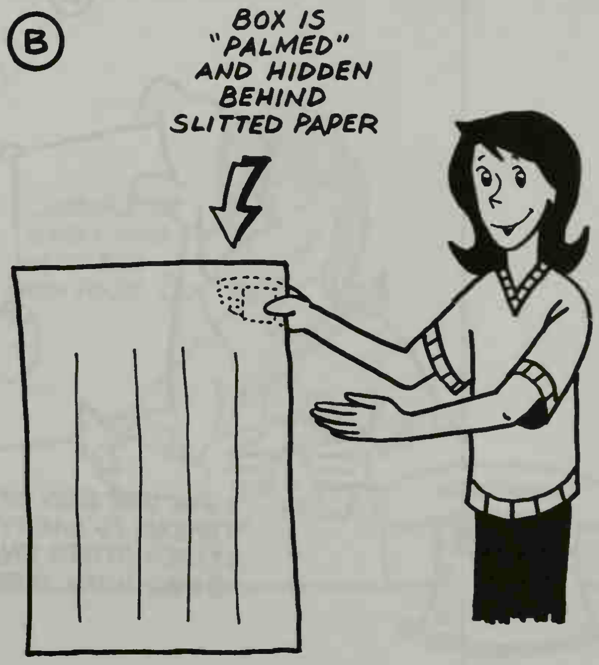
3. Sliding your right hand out from under the newspaper, grasp the paper between your thumb and fingers. If you hold the paper near the top in this manner, out to your right side, no one will have seen the box attached to your palm or the rubber band (B).
4. With your left hand, point to different stories on the newspaper page. Trace your finger along the cuts in the paper as if you were reading. (Do indeed read from the paper, but add your own last line to each story. You can use these endings or make up your own.)
5. As you get to your new ending of each story, reach into the cut on the paper and pull out a handkerchief! Remember in what order you put them in the box so you will know the order in which they will come out.

The endings: "So it turns out that everything ended up *rosy*!" (Pull out red handkerchief.)

"And they were *green* with envy!" (Pull out green handkerchief.)

"That car was a total *lemon*!" (Pull out the yellow handkerchief.)

"The Bobcats keep losing. They must really have the *blues*!" (Pull out the blue handkerchief.)


Ⓑ
BOX IS "PALMED" AND HIDDEN BEHIND SLITTED PAPER

36

Eggsibit

Put an egg in a hat and make it disappear!

What You'll Need

- needle
- thread
- handkerchief
- adhesive tape
- empty eggshell (you can find these at major shops, or maybe Mom or Dad knows how to "blow out" the contents of an egg)

Getting Ready

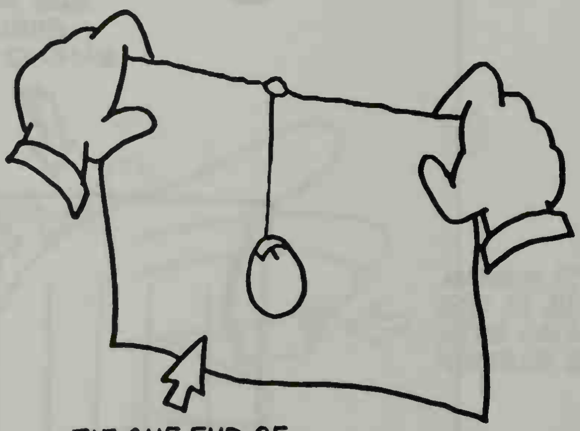
Using the needle, tie one end of the thread to the edge of the handkerchief, right in between two corners. Attach the other end of the thread to the egg with the tape. The egg should hang almost ⅔ of the way down the handkerchief (A).

Set the hat upside down on the table. Crumple up the handkerchief around the egg to hide it, and place it next to the hat.

Show Time!

1. Show the audience the empty hat, inside and out.
2. Lift the handkerchief by its corners so that the attached egg is on *your* side of the handkerchief.

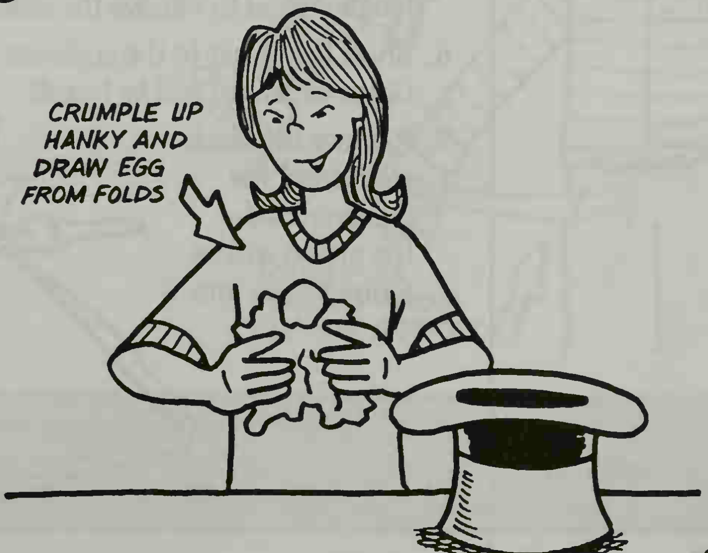
(A)



TIE ONE END OF THREAD TO HANKY; ATTACH OTHER END TO EGG WITH TAPE

3. Crumple up the handkerchief again and then draw the egg up from its folds (B). Show the audience that the egg has magically appeared!
4. Next, gently place the egg in the hat with the handkerchief around it.
5. Remove the handkerchief from the hat, again holding its upper corners with the egg facing you. No one will know the egg is there.
6. Repeat Steps 3, 4, and 5 two more times.
7. Say, "I'm sure you think there were three eggs hidden in here," pointing to the hat.
8. Since you've been placing each egg that "magically" appeared in the hat, surely everyone thinks that's where they are. You now say, "Well, they are . . . *not*!" Turn the hat over as you say this. Of course, there will be no eggs in it!
9. You can plan a surprise ending for this trick. Look all over for the eggs. Lift up the handkerchief to look under it, and "accidentally" (but really on purpose) show the audience the string and the egg. Say, "Gotcha!" Your audience will appreciate being let in on one trick.

Ⓑ



37

Break Out!

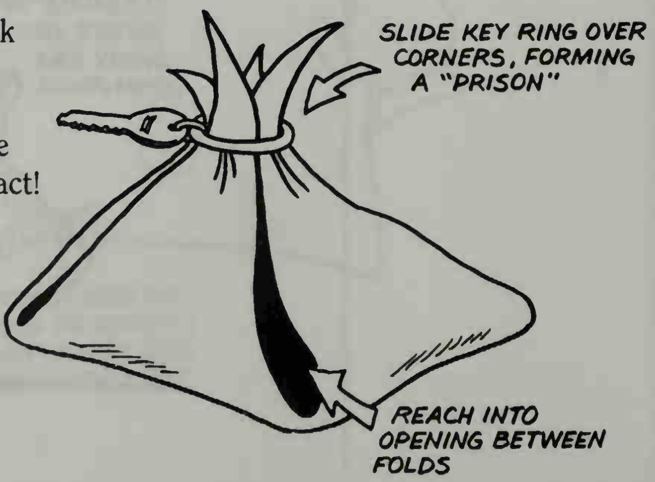
Just like Houdini, but on a smaller scale, remove an object from a maximum security handkerchief! This trick even stuns volunteers from the audience.

What You'll Need

- man's large handkerchief
- small object borrowed from the audience or supplied by you
- key ring, 1 inch in diameter
- large piece of black cloth

Show Time!

1. Show the audience both sides of the open handkerchief. Tell them you will trap an object in this handkerchief and then attempt to remove it by mystical means.
2. Lay the handkerchief on the table. Ask someone in the audience for a ring, a key, or a dime. Place the object in the center of the open handkerchief. Draw together the far corners around it.
3. Put the key ring over the top of the corners, forming a little "prison" for the object.
4. Invite four members of the audience to help you "secure" the prison. Each volunteer should take hold of one corner of the handkerchief and hold on to it tightly.
5. Drape the large black cloth over the handkerchief prison and the volunteers' hands. The magic moment: Simply reach under the black cloth and into the opening between the folds of the handkerchief to remove the object.
6. Show the object to the audience and the surprised volunteers. Gasps of delight will be heard!
7. Remove the black cloth from the handkerchief—the prison will be found totally intact!


SLIDE KEY RING OVER CORNERS, FORMING A "PRISON"
REACH INTO OPENING BETWEEN FOLDS

38

Tricky Pockets

You can create magic easily with several different day-to-day items including clothing! Here is a trick that utilizes your pants pockets.

What You'll Need

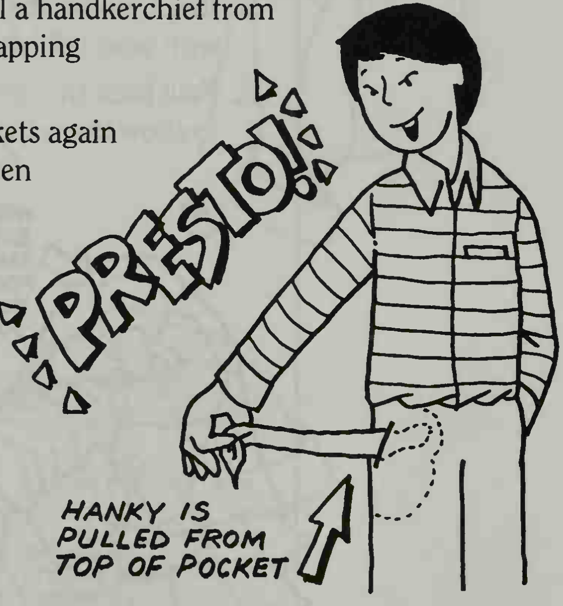
- a very large silky handkerchief
- a pair of your pants with front pockets

Getting Ready

All you have to do to get ready is examine your front pants pockets. Most pants have deep pockets, but they also have a rather large space of fabric in the upper corner that goes all the way to the zipper or buttons. What a super place to hide things! Wad or fold up the handkerchief and stuff it into this extra space before you perform this trick.

Show Time!

1. Say to the audience, "I have nothing in my hands. I have nothing in my pockets." And then to prove it, turn your pockets inside out. (You can only pull out the deep part.)
2. Stuff your pockets back inside your pants. Say, "I can pull a handkerchief from my pocket just by snapping my fingers."
3. Reach into your pockets again and pull out the hidden handkerchief.


PRESTO!
HANKY IS PULLED FROM TOP OF POCKET

NOTE: As you grasp the handkerchief, reach way down to the bottom of your pocket, so it looks as if the handkerchief came from the *bottom*, not the top, of your pocket.

39

The Mystical Coin

You, the magician, can swiftly pass a mystical coin through an ordinary handkerchief.

What You'll Need

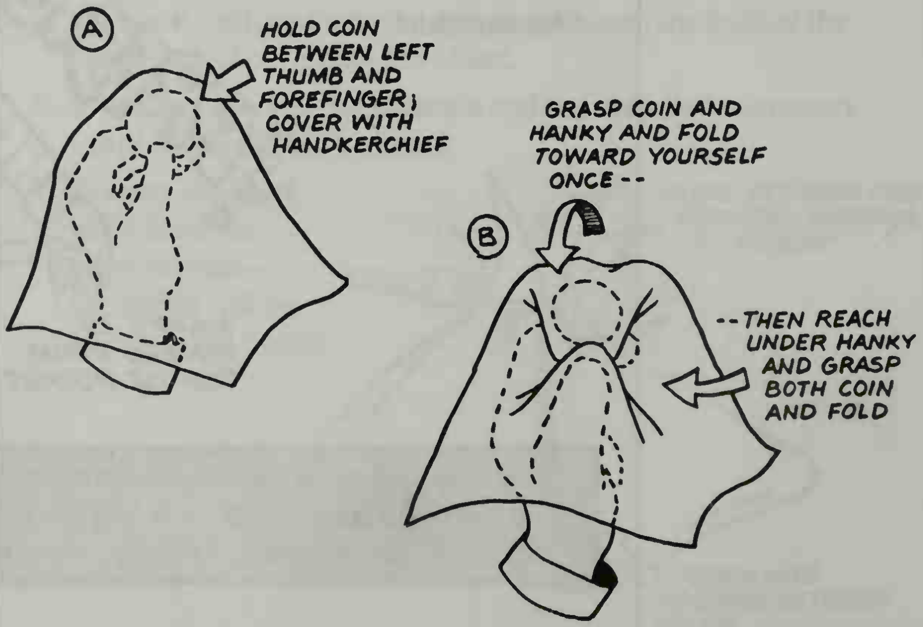
- large coin (no smaller than a quarter)
- handkerchief

Getting Ready

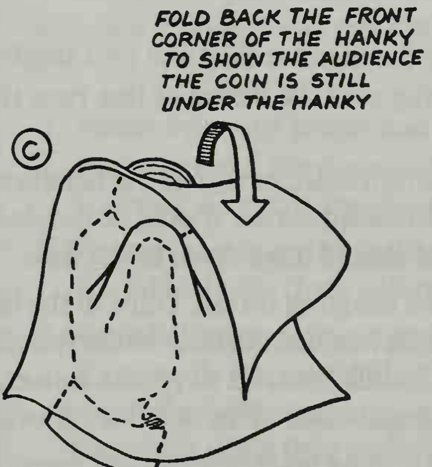
To get ready for this trick, you must practice. Only smooth, quick moves will give you the results you will need to astonish your audience.

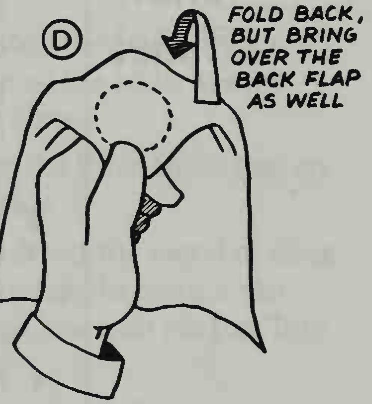
Show Time!

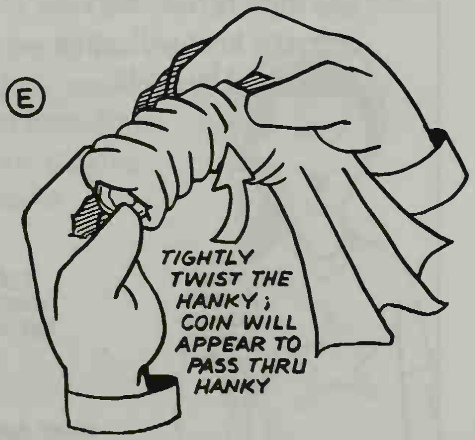
1. Hold the coin up between your left thumb and forefinger in front of the audience.
2. Cover your left hand with the handkerchief (A).
3. Grasp the coin through the handkerchief with your right hand.
4. Fold the coin and the handkerchief toward yourself once.
5. Reach under the handkerchief, grasp the coin, and make a fold with your left hand (B).
6. Fold back the corner of the handkerchief, facing the audience, to show them the coin is still there (C).


A
HOLD COIN BETWEEN LEFT THUMB AND FOREFINGER; COVER WITH HANDKERCHIEF
GRASP COIN AND HANKY AND FOLD TOWARD YOURSELF ONCE --
B
--THEN REACH UNDER HANKY AND GRASP BOTH COIN AND FOLD

7. What makes this trick work? Cover the exposed coin again—but instead of bringing back only the one flap of the handkerchief, bring over the opposite flap as well (D). To the audience, it will look as if you just covered it up again normally.
8. Tightly twist the handkerchief just under the coin. It will appear to be wrapped snugly.
9. Work the coin out of the secret opening created by the folds of the handkerchief (E). If done smoothly, even you will think the coin has risen up through the handkerchief!


FOLD BACK THE FRONT CORNER OF THE HANKY TO SHOW THE AUDIENCE THE COIN IS STILL UNDER THE HANKY
C


D
FOLD BACK, BUT BRING OVER THE BACK FLAP AS WELL


E
TIGHTLY TWIST THE HANKY; COIN WILL APPEAR TO PASS THRU HANKY

40

The Dancing Handkerchief

A handkerchief with a mind of its own? With magic, anything can happen! Learn how to make a knotted handkerchief dance itself undone in this impressive trick.

What You'll Need

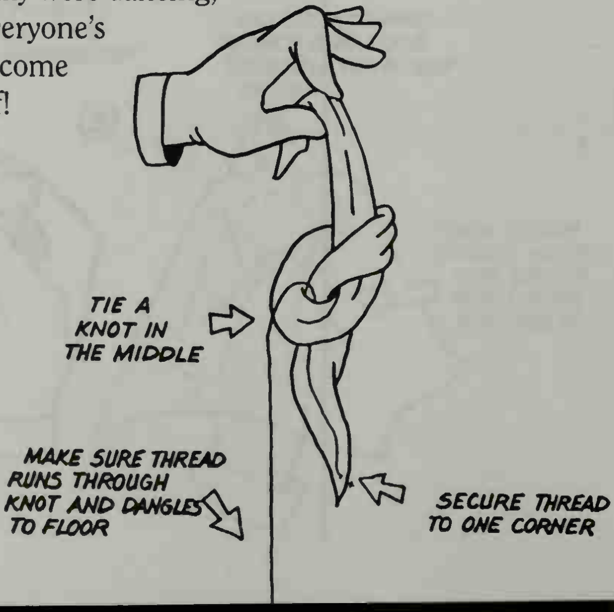
- large silky handkerchief
- 2 to 3 feet of black thread or ultrafine clear fishing line
- needle

Getting Ready

To prepare the handkerchief, secure the thread or line to one corner of the handkerchief with the needle. Tie a good, strong knot and lay the thread back across the handkerchief.

Show Time!

1. Gather up the handkerchief and tie a single knot in the middle of it, making sure the thread or line runs right through its center.
2. Hold the unthreaded corner of the handkerchief in your fingertips. The threaded corner should be pointed toward the floor. The thread should hang down to the floor.
3. Step on the dangling thread. Point to the handkerchief and talk about its magical qualities while you step on the thread. Say, "This handkerchief is not just a dancer, it's a fancy dancer. It can untangle itself." This is called "drawing attention."
4. Next, gently move your hand up and down, back and forth to music as if the hanky were dancing, and right before everyone's eyes, the knot will come undone all by itself!


TIE A KNOT IN THE MIDDLE
MAKE SURE THREAD RUNS THROUGH KNOT AND DANGLES TO FLOOR
SECURE THREAD TO ONE CORNER

41

The Sound of Silver

Half the fun of magic is knowing more than your friends do, or even pretending to know more, especially strange, unusual things like the difference between the sound of copper and silver!

What You'll Need

- clear-drying glue
- ¼-inch strand of your hair
- 2 pennies
- 3 twist-on bottle caps
- 1 dime
- sharp pencil

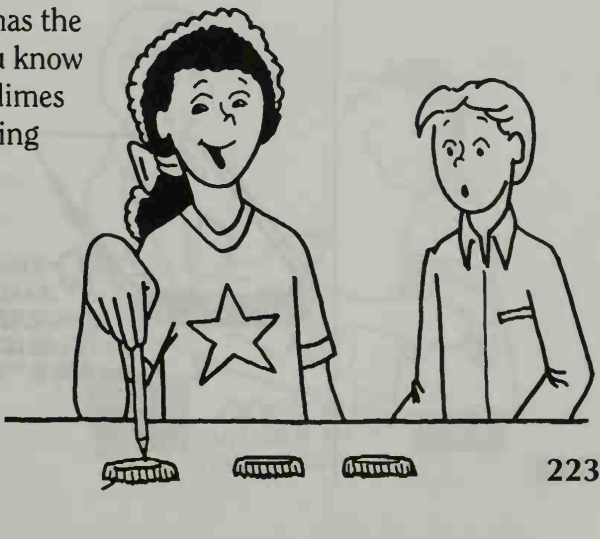
Getting Ready

Carefully glue the strand of hair to the penny so that the tiniest bit sticks out over the edge of it, just enough to stick out from under the edge of a bottle cap placed over the penny.

Just before your show, remember to put two pennies (one special, one ordinary) and one dime in one of your pockets.

Show Time!

1. Reach into your pocket and pull out the change. Take the special penny and the dime and put them on the table. Ask the audience if anyone can spare another dime.
2. As soon as you are given the dime, put the three bottle tops on the table. Invite three volunteers onstage.
3. Explain that your fine-tuned ears can detect the sound of silver. To prove it, you would like them to arrange the coins underneath the bottle tops any way they wish, one coin per top. Turn your back while they do it.
4. When you turn around again, ask the audience for complete silence. Tap each top with your pencil point.
5. Since the penny has the hair attached, you know which tops have dimes under them, making it much easier to detect the silver!



42

Colorized

The next trick is so much fun to do—and is so unbelievable—that you will probably practice it more than any of the others just to see the ever-amazing results.

What You'll Need

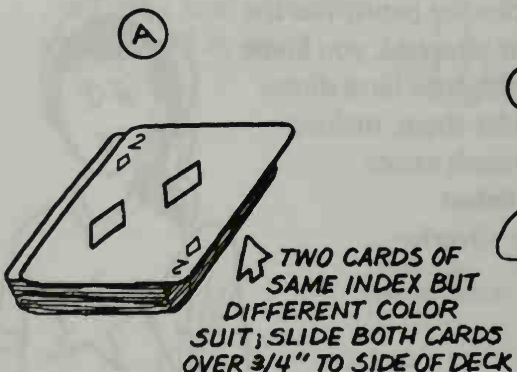
- deck of cards

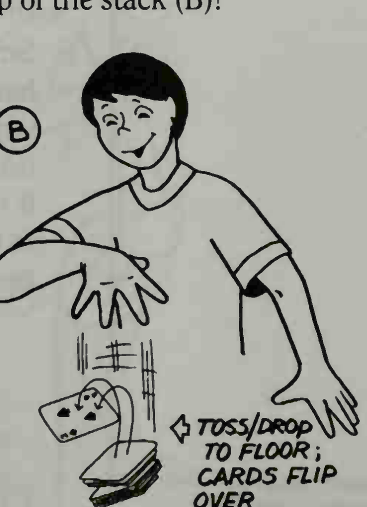
Getting Ready

First, arrange the deck so that the top two cards are the same number or face but are in different color suits: one 4 of diamonds and one 4 of spades, for example. After that, you just need to practice to get the trick right.

Show Time!

1. Hold the deck facedown in one hand.
2. Flip up the first card.
3. Slide that card, and the one right under it, about ¾ of an inch over the side of the deck (over the left side if the deck is in your right hand, over the right side of the deck if it is in your left hand). Be sure to slide them over at the same time so they look like one (A).
4. Hold the deck in your hand, overhanded. Throw the pack firmly but neatly so the stack remains intact, onto the floor. (Be sure not to do it *too* hard, or you will be picking up a lot of cards!)
5. The rush of air will flip the top cards over, making the secret second card suddenly appear on top of the stack (B)!


A
TWO CARDS OF SAME INDEX BUT DIFFERENT COLOR SUIT; SLIDE BOTH CARDS OVER 3/4" TO SIDE OF DECK


B
TOSS/DROP TO FLOOR; CARDS FLIP OVER

43

Penny-tration

Make a penny penetrate a human hand!

What You'll Need

- 7 pennies

Show Time!

1. Show your audience that you have seven pennies. Have a volunteer drop them one by one into your cupped hand and count them out loud. Tell the volunteer that you can make one of the pennies pass through his hand. Before you start putting the pennies in his hand, warn the volunteer that he must quickly close it once the seventh penny is dropped in.
2. Hold six of the pennies in your right hand and the seventh in your left. Making sure that the volunteer's hand is cupped, place the pennies into it one by one, counting them out loud. The first one won't make a noise, but the rest will clink.
3. When you get to the sixth penny, just clink it against the others in the volunteer's hand, and bring it out again hidden between your fingers. The seventh penny should be quickly dropped into your other hand.
4. Carefully and firmly cup your hand with the penny in it underneath the volunteer's fist so that his knuckles are facing downward.
5. Explain that it takes extreme concentration and incredible magic power to make pennies pass through skin and bones while you slowly flatten your hand against his knuckles. Now say, "Did you feel that? Look! I hold a penny in my hand. Quick! Count the pennies in your hand." Won't everyone be shocked to see only six pennies in the volunteer's hand!

PENNY IS HIDDEN IN YOUR PALM

44

A Head for Numbers

Use your mental powers to guess the name of a card right through a closed card box.

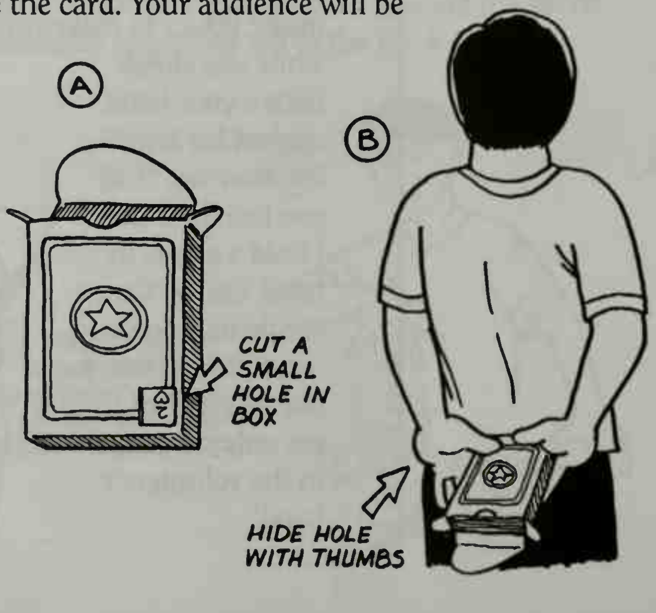
What You'll Need

- scissors
- deck of cards
- box for card deck

Before the start of the show, cut a very small hole in one lower corner of the box (A).

Show Time!

1. Spread the cards out on the table.
2. Hold the empty card box behind your back with its top open and facing away from you. The special hole will be facing upward. Hold it at its lower end, and cover the hole with your thumbs (B).
3. Invite anyone from the audience to pick a card from the deck, look at the card, and remember it. Then have the volunteer insert the card faceup in the box and close the box while it is still in your hands behind your back.
4. The volunteer may be seated. Bring the box to your forehead. Say, "I can find out what card you had by reading your mind." As you lift the box over your eyes, glance into the hole to find out the identity of the card.
5. Place the closed box against your forehead with your eyes closed. Pretend to concentrate hard! You can even hum for effect. Name the card. Your audience will be impressed!



45

Mental Telepathy

Can you read minds? It'll sure look like it with this trick of ESP!

What You'll Need

- deck of cards

Getting Ready

Before you begin, pick out any two cards from the deck and put them in your pocket.

Show Time!

1. Ask a volunteer to choose three cards and show them to you and the audience. They can be from anywhere in the deck. Ask another member of the audience to concentrate hard on one of the three cards.
2. Put the three cards in your pocket with the other two secret cards. (REMEMBER! Note the order in which you place the three cards in your pocket.)
3. Draw out the two cards that you put in your pocket before the show. Don't show them to the audience. They will appear to be two of the three you placed in your pocket a moment ago.
4. Lay the two cards facedown on top of the deck.
5. Say to the second volunteer, "If you have been thinking of your card, it will be the one still in my pocket." Ask her to name the card.
6. The volunteer gives the name of one of the three cards shown earlier. Since you carefully noted the cards and their order in your pocket, simply pull the audience member's chosen card from your pocket!

46

Houdini's Just Passing Through

Is it possible for a person to pass right through a playing card?

What You'll Need

- playing card
- sharp pair of scissors

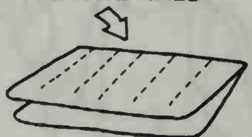
Getting Ready

Preparation of the playing card is everything in this trick. Since you need to cut the card several times with a pair of scissors, you may want to practice a lot. You may also want a parent to help prepare the card for you. It is a good idea to practice with paper, then practice on cards in an incomplete deck. Steps 2–4 can be done before the magic show. Later, you can cut the card right onstage!

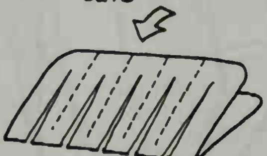
Show Time!

1. Show the audience that you have an ordinary playing card. Tell them you are going to walk through this card. Fold the card lengthwise, making a sharp crease with your fingernail or a pencil.
2. Starting at one end, cut from the fold almost to the edge of the card several times. Cuts should be ⅛ inch apart (A).
3. Now make cuts from the edge, almost to the fold, in between the cuts you just made (B).
4. Cut each fold along the crease except for the outer two (C). If everything is done correctly, you will have created one very long, delicate chain, big enough for a person to pass through.
5. Ask a volunteer to hold the long chain in an arch. When you walk through the special card, everyone will be surprised!

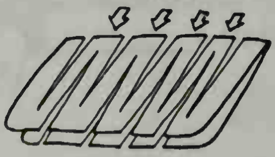
Ⓐ FOLD CARD LENGTHWISE AND CUT FROM FOLD TO NEAR THE EDGE SEVERAL TIMES



Ⓑ CUT FROM THE EDGE TO NEAR THE FOLD, IN BETWEEN OTHER CUTS



Ⓒ CUT EACH FOLD ALONG CREASE EXCEPT FOR THE OUTER TWO



47

Discard

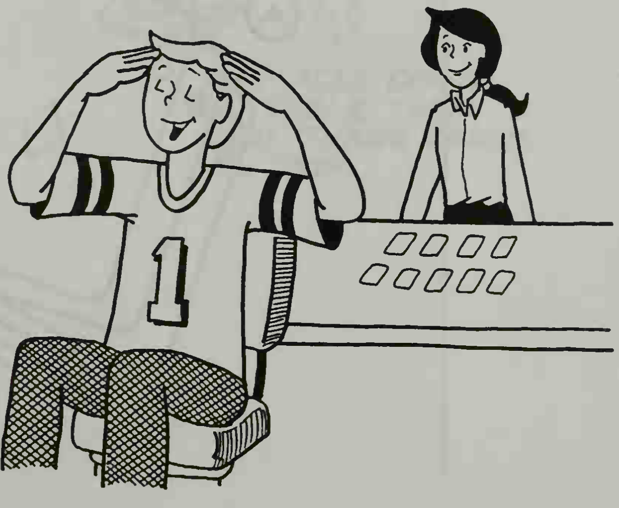
You can stump your friends over and over with this clever card trick.

What You'll Need

- deck of cards

Show Time!

1. Invite a member of the audience to the table to be your subject. Ask your volunteer to lay out two rows of cards, any number of them, as long as the bottom row has as many cards as the top row. You should be blindfolded or have your back to your subject. (You can even do this trick on the telephone with your subject!)
2. Instruct the volunteer to take one card away from the bottom row.
3. Now ask your volunteer to decide how many cards she would like to take from the top row. She should tell you this number and take away exactly that many cards from the top row only.
4. Now instruct her to take away from the bottom row the number of cards left in the top row.
5. Now tell the volunteer to get rid of the rest of the cards in the top row.
6. The object of having your back to the subject or being blindfolded or even on the phone is to correctly guess how many cards are left. The answer is always right if you remember the number of cards that your subject removed previously from the top row. It is always exactly *one* less than the number given!



48

Four Aces

Watch four aces magically jump from the pack to the table! This trick takes practice and careful, swift hand movements.

What You'll Need

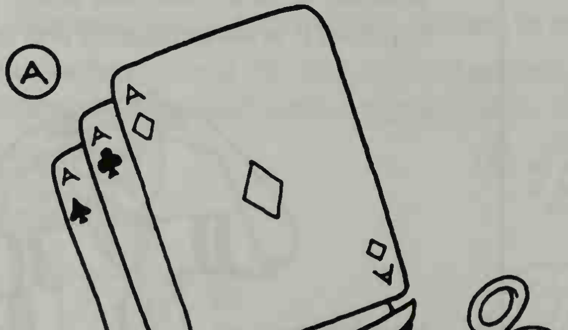
- 2 decks of cards (both with the same back pattern)
- ruler
- large pair of scissors

Getting Ready

From one deck of cards, pull the ace of diamonds, ace of clubs, and ace of spades. Set the pack aside because it won't be needed anymore. Measure and cut 1/16 inch off from the bottom of each of the aces (A). Before the performance, take the three cut aces and the normal ace of hearts from the other deck of cards and set all four cards in a pile on the table. Place the remaining three normal aces seventh, eighth, and ninth from the top in the deck (B).

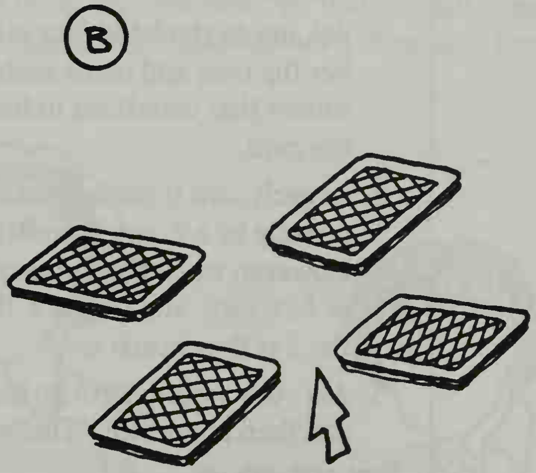
Show Time!

1. Tell the audience you have removed the aces from the deck. Point to the pile on the table.
2. Lay each ace facedown on the table in this order: ace of clubs, ace of spades, ace of hearts, ace of diamonds. Let the audience see each one as you set it down.
3. Deal three cards from the top of the main deck on top of the ace of clubs, then the ace of spades, the ace of hearts, and finally the ace of diamonds.



CUT 1/16" OFF OF ACES OF SPADES, CLUBS, AND DIAMONDS

4. Ask an audience member to call out 1, 2, 3, or 4. Count off each pile of cards so that no matter which number is picked, the pile with the ace of hearts is always the stack on which the count ends.
5. Put the other three piles back on the main deck. Shuffle the deck.
6. Snap the back of the deck with your finger and say, “Ready.” Slowly and carefully, flip through the deck so the audience can see the top of each card. Surprisingly, there are no aces! (The cut aces won’t be seen because they are shorter.)
7. Invite someone from the audience to turn over the stack of cards left on the table. What will be found? Four aces!



LAY ACES DOWN ON TABLE, THEN DEAL THREE CARDS ON TOP

49 All in the Voice

A volunteer's vocal vibrations will help identify a specific card in this mind-boggling magic trick!

What You'll Need

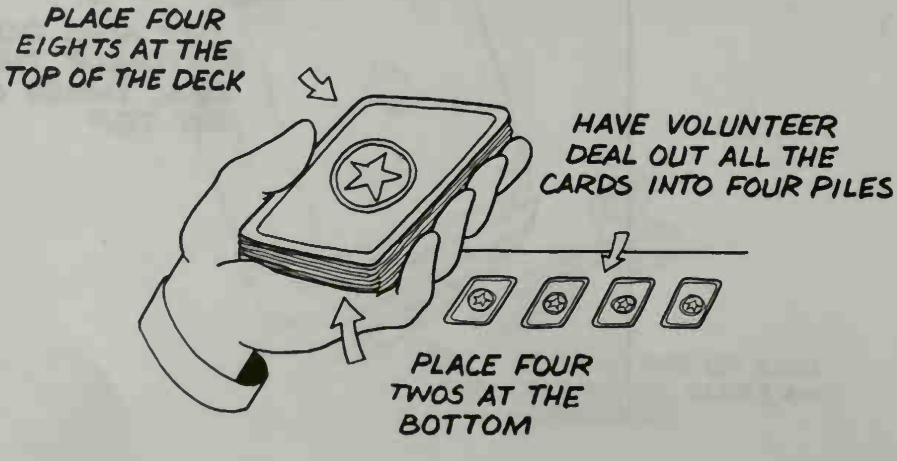
- deck of cards

Getting Ready

Before the magic show, place the four 8s at the top of the pack and the four 2s at the bottom of the pack.

Show Time!

1. Have a volunteer take the deck of cards in her hand and deal out all the cards into four piles.
2. After dealing the cards, ask the volunteer to pick one card from the middle of the pile, look at it, remember it, and put it on top of another pile.
3. Ask her to stack the four piles on top of each other. Then have her flip over and name each card, one at a time. Tell your volunteer that vibrations in her voice will give away the identity of the card.
4. As each card is named, listen for the number 8. If it is followed directly by a 2, you know that the chosen card is not near. However, when the number 8 is followed by another number or face card, and then a 2, the number in between the 8 and the 2 is the chosen card!
5. Ask your volunteer to go back and name the last few again. You can then announce, "That's it! I can feel the vibrations!"


PLACE FOUR EIGHTS AT THE TOP OF THE DECK
HAVE VOLUNTEER DEAL OUT ALL THE CARDS INTO FOUR PILES
PLACE FOUR TWOS AT THE BOTTOM

50

Fifteen Cents

Test your friends' math wit with this brainteaser at school or at a magic show!

What You'll Need

- 1 dime
- 1 nickel

Getting Ready

Before you begin, secretly place the dime and nickel in your hand. Make a fist around the coins.

Show Time!

1. "I am holding two American coins in my hand that add up to fifteen cents. One of them is not a dime," you say.
2. Pick a volunteer to figure out the problem. The answers given will be very surprising. You may not get any answers at all!
3. When you think the volunteer has had enough, open your hand and say, "I said one of them was not a dime, and I'm right—it's a nickel!"

NOTE: Get ready to run!

Raise the Curtain!

(A Guide to Putting on Your Own Magic Show)

Okay, so you have practiced your tricks until you can do them in your sleep. Now what? Time to put on a show! But how? Here are a few pointers that will help you to organize your thoughts and tricks to form a show of magic and mystery in front of a—gulp!—real audience.

Choose a location for your show.

First you need to figure out where you'll be performing. Outside or inside? In a house or an auditorium? If it is going to be outside, plan for wind. It may not be windy during your program, but you should plan for that possibility by using heavy props or using something to weigh down lighter equipment.

Another very important factor you must plan for is how your audience will be seated. How close will they be to you? Will everyone be able to see, or will they be able to see *too much*? Will the entire audience be seated in front of you, or will you be surrounded on all four sides by audience members? You might not be able to perform certain tricks if there are people seated behind you. They will be able to see things you may not want them to see.

Know your audience.

Obviously, you must know what type of audience you will be performing for before you plan your show. Will little kids be in the audience? Is the entire audience made up of kids your age, or are they all going to be adults? If there is a mixture of people, then you should present a variety of magic that will appeal to all ages present.

Whoever your audience is, never present your tricks in a manner that makes you look superior to the members. You don't want to come off as someone who seems to be saying, "Look what I can do, and you can't," when you are demonstrating one of your magic tricks. Your audience is there to be entertained, not insulted.

Outline your show.

Once you know where you'll be performing and who will be watching, you need to choose your tricks. The flow of your show is very important. Plan a quick attention-getting trick to start your show with a bang. That way you can be sure to grab your audience early on. End your performance with a really big, impressive trick that will leave them talking.

Now decide the order in which you will perform the rest of your tricks. Make sure there are no lulls or any "slow time." The audience should be mystified and entertained the entire time. An easy way to see how your show is moving is to have all your tricks written out on index cards. Lay out the index cards in the order you think your show should go. Now you can move the cards around and change the location of certain tricks until your show flows the best it possibly can.

Put together a prop list.

Create a list of the props you will need for each trick. This compilation of items will serve as a checklist to see that you have everything needed for your show before you start. It will also come in handy after the show to be sure you don't leave anything behind. Check and double check this list before and after each show.

Choose an appropriate costume or outfit.

What kind of costume should you wear in your show? Should you wear a costume at all? It depends on what kind of image you are trying to create.

Are you presenting the magic as yourself, or are you playing the part of an ancient sorcerer or conjurer? Are you going to be a serious magician or a humorous one? Whatever decision you make, your clothes or costume should reflect that. The more you look like the character you are trying to portray, the more your audience will believe it.

Leave 'em wanting more!

Your props are all in place, and your costume is just right. You have your show together. Now is the time to bring up one of the most important rules to remember as a magician: Less is more. What this means is, always finish your show with the audience wanting to see more. Nothing is more boring than a magician who doesn't know when to quit!

Follow the outline that you prepared for your show, and perform only those tricks. If your audience demands more when you've finished, go ahead and perform an encore—in this case, an additional trick or two—if you are prepared to do so. After that, stop. No matter how well your show went, and no matter how tempting it may be to continue—hold off. If they truly enjoyed your performance, they will be eager to see you perform again in the future. One of the best things you can do as a budding magician is to create anticipation in your audience to want to see you again.

Magic Terms

betcha—A stunt or a puzzle the magician presents that is not really a magic trick. Instead, these are usually challenges to the audience wherein a volunteer will try again and again only to fail. The magician, however, can *always* achieve the desired result. Betchas are also different from magic tricks in that the methods to all magic tricks are kept secret, but the secret to a betcha is divulged as soon as the magician demonstrates it.

close-up magic—Magic that can be performed at a table or in people's hands. Usually, close-up magic can be performed with people sitting next to you and often involves cards, coins, rubber bands, or other small objects.

effect—Another name for "magic trick." They are called either magic tricks or magic effects.

escapologist—Official name for an "escape artist." This person can escape from any restraint he or she is placed into. Harry Houdini, one of the most amazing magicians ever, was also an escapologist.

legerdemain—Another term for "magic" or "sleight of hand."

levitation—Any of a number of magic tricks where the magician seemingly causes someone or something to float without any visible means of support.

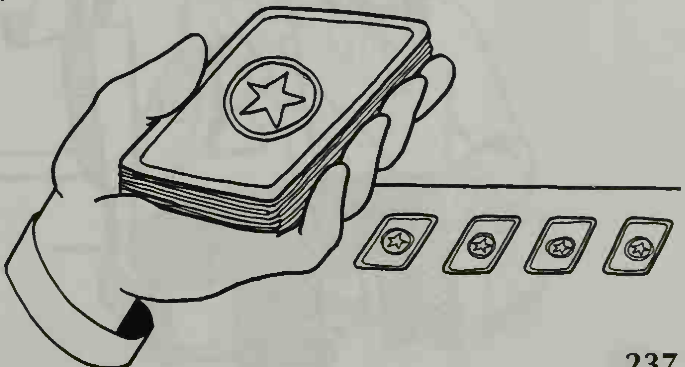
load—Any object or a number of objects hidden that the magician "magically" reveals to the audience at some time during the trick. Sometimes the magician is required to get this load from one place to another without it being detected. Other times the load is already in place, but is kept hidden until the right moment. For examples of a load, see:

Trick #2, "Classic Cups and Balls"

Trick #32, "The Turning Box"

location—A term usually associated with card tricks. Most card tricks fall into this category. A card is selected and put back into the deck. The magician then locates that card in some magical manner. See:

Trick #49, "All in the Voice"



mentalism—The name given to the branch of magic in which the performer appears to read people's minds or know the outcome of future events before they occur. The person who performs mentalism is not called a "magician," but a "mentalist." A mentalist calls the tricks he or she performs "experiments." These "experiments" are usually one of four types:

clairvoyance—A mental effect where the mentalist apparently receives his or her information from outside sources unknown to everybody but the mentalist.

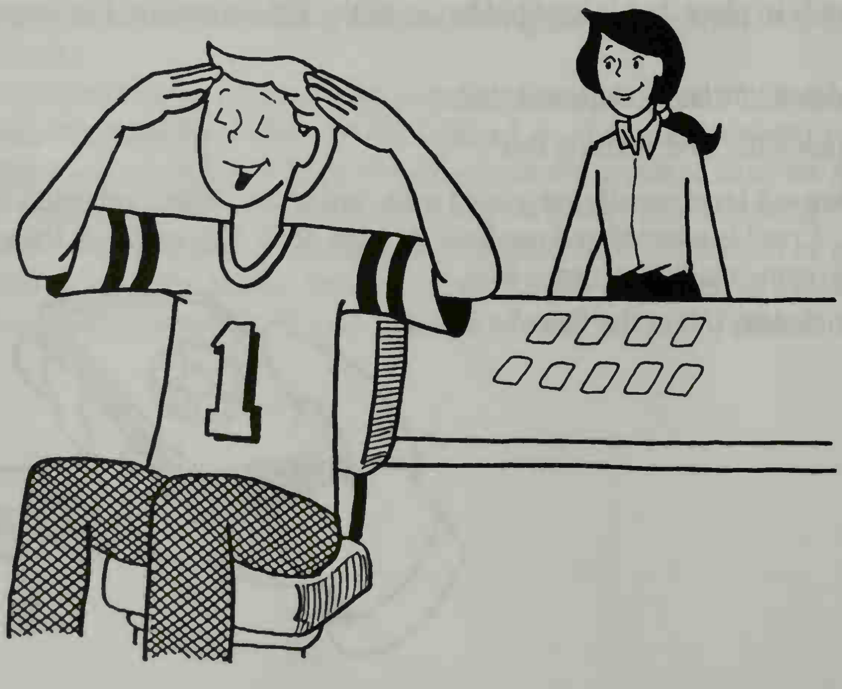
precognition—A mental experiment in which the mentalist knows of something before it happens. This is usually proven by way of revealing a prediction of some sort that was made by the mentalist before the experiment began.

telepathy—In this type of experiment, the mentalist "links minds" with someone else. Either the mentalist "receives the volunteer's thoughts" or "sends" his or her thoughts to the volunteer.

telekinesis—The apparent ability to physically move objects using only the power of the mind. For examples of tricks in mentalism, see:

Trick #24, "Mind Reader"
Trick #44, "A Head for Numbers"
Trick #45, "Mental Telepathy"
Trick #47, "Discard"

misdirection—The name given to the ability to divert the audience's attention away from the secret of the trick. Basically, it is "making them look where you want them to look." Most magicians rely heavily on misdirection throughout their performance.



palming—The process of secretly hiding one or more small objects in the hand while, at the same time, keeping the hand in a natural position as if it contains nothing. If this is done properly, the object is never detected. The following tricks use palming:

Trick #7, "The Tissue Tease"

Trick #35, "Good News!"

patter—What the magician says to his or her audience while performing a trick. Another way of putting it is to say that patter is the "script" to the trick.

penetration—Any magic trick involving two solid objects passing through one another. This type of magic effect can be found in:

Trick #14, "Breakthrough!"

Trick #39, "The Mystical Coin"

Trick #43, "Penny-tration"

prestidigitation—Another name for "sleight of hand." A magician is sometimes called a "prestidigitator."

production—Any magic trick involving the sudden appearance of someone or something. This object or person can appear from nowhere or out of a box or container that was previously shown empty. Tricks of production are found in:

Trick #15, "Ribbons Around Us"

Trick #32, "The Turning Box"

Trick #35, "Good News!"

Trick #38, "Tricky Pockets"

pull—A device used by magicians to make objects disappear. There are many different styles and shapes of pulls that can make a variety of objects vanish. For examples, see:

Trick #1, "Big Squeeze"

Trick #10, "Zap Ball"

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restoration—Any trick where the magician destroys something (by tearing or cutting, for example), then magically puts it back together. See:

Trick #22, "Ice Slice"

suspension—A type of magic trick in which the magician causes someone or something to hang suspended at an angle or location that defies the law of gravity. You can see tricks of suspension in:

Trick #12, "The Ball Tube"

Trick #23, "Magic Bottle"

thaumaturgy—Another word for "magic."

transformation—Any trick involving the magical changing of one object into another. For examples, see:

Trick #5, "Tip Over Tube"

Trick #7, "The Tissue Tease"

Trick #9, "Super Paper"

Trick #17, "Balloon Magic"

Trick #31, "The Ching-Chang Basket"

Trick #42, "Colorized"

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transposition—Any magic trick where the magician causes two or more people or objects to magically switch places. This magic effect can be found in:

Trick #33, "Out of Order"

Trick #48, "Four Aces"

vanish—Any magic trick in which the magician causes an object or a person to disappear without a trace. Examples of vanishing tricks appear in:

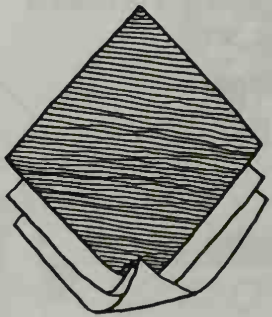
Trick #1, "Big Squeeze"

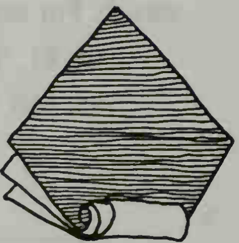
Trick #6, "What Water?"

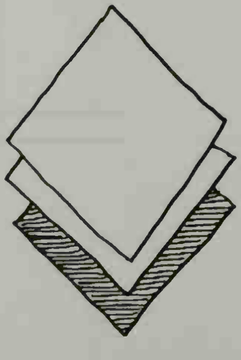
Trick #10, "Zap Ball"

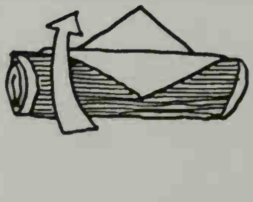
Trick #11, "Ball Gone"

Trick #34, "Disappearing Card"









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